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Wayne Oil Tank & Pump Co.
Bulletins

Wayne
TRADE MARK

A Few General Rules for Selecting the Proper Power Pump for the Duty to be Performed

BULLETIN No. 2

Many pumps of proven efficiency and durability have been condemned, and returned to the manufacturer, simply because the proper size or type of pump for the duty was not selected, or the pump was not properly installed. Such troubles can be entirely avoided by simply applying the following general rules which we have made as clear and simple as possible:

(1) The impeller type pumps are constructed to maintain a maximum pressure of 30 pounds per square inch. It is advisable to operate these pumps at a lower pressure.

(2) When it is necessary to maintain a pressure at the discharge point greater than these impeller pumps will maintain, it will be necessary to supply a triplex plunger type pump. These pumps will maintain pressures up to 150 pounds per square inch.

(3) With regard to the capacity of a pump, or gallons delivered per minute, it is as bad to supply a pump much too large for the service as it is to supply one not large enough. This is especially true in oil burning systems, and should be given careful consideration. However, if the piping is not properly figured the pump will not deliver its rated capacity.

(4) The pressure under which a pump must work is generally expressed in feet of head, such as "A 10 foot suction head", or "A 20 foot discharge head". Such phrases usually mean the vertical suction or discharge heights in feet. However, in ordering a pump the horizontal distance of the runs of suction and discharge pipe should also be given.

The pressure expressed in feet of head can easily be converted into pounds of pressure per square inch by referring to the table in the center of page 3 of Bulletin No. 150. That is, a 10 foot head is equivalent to 4.33 pounds pressure per square inch and a 20 foot head 8.66 pounds pressure.

(5) The pump must be placed as near as possible to the source of supply or storage tank. The load should be on the discharge side of the pump and not on the suction side.

(6) The sizes of the suction and discharge pipes and their lengths directly affect the amount of power required to run the pump or the loss of pressure between the pump and discharge points.

This is due to the friction of the oil in passing through the pipe and around elbows.

In delivering a certain number of gallons per minute through a certain length of pipe, the smaller the pipe the greater the friction because of the greater speed at which the oil must travel.

(7) The height or vertical distance of the suction and discharge pipes also directly affects the power required to drive the pump or the loss of pressure between the pump and discharge point. The higher you push or draw the oil, the more power you must have to do it. For every foot you push water vertically in a discharge pipe, you must have .434 pounds pressure.

(8) The suction and discharge pipes should always be at least as large as the pipe connections on the pump. When long pipe runs are used it is necessary to increase the size to allow for friction.

(9) Power pumps should never be furnished without a bypass and relief valve. This feature allows the oil to be pumped back into the suction line when the outlet, or discharge point, is closed, and the pump continues to run. Without such fittings, should the discharge point be closed and the pump continue to run, something must smash. A pipe or the pump will break, the motor will burn out, or, if belt driven, the belt will be thrown off the pulley.

(10) It is advisable, where possible, to furnish foot valves or check valves with power pumps. These valves hold the oil up to the pump and avoid the necessity of priming the pump every time it is used.

(11) The discharge pipe should slope from the discharge point down to the pump and the suction pipe from the pump down to the tank. Care should be taken to avoid traps in the pipe lines which cause air pockets.

(12) All pipe threads should be carefully cut and a mixture of litharge and glycerine used in

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ing up joints. This mixture should be applied to the male end of the connection to avoid its pulling into the pipe. All joints should be pulled up as tightly as possible. Lamp wicking, red lead or white lead must not be used.

(13) In no case should the pump be placed on a level more than 12 feet for gasoline and 15 feet for oil above the bottom of the tank from which it draws.

(14) All pumps directly connected with direct current or single phase alternating current electric motors when used for pumping gasoline should have the electric motors totally enclosed and the outfit should be placed in a fireproof house properly vented.

(15) All switches, or automatic starters, and electric motors, when not enclosed and driven by belt, should be placed at least five feet above the floor level.

To Figure the Proper Size of Suction and Discharge Pipes

In figuring the proper sizes of suction and discharge pipes for a certain duty we must use the tables given in Bulletin No. 150. These tables are based on water, but they may be used when gasoline or oils are to be pumped with a sufficient degree of accuracy.

Consider that we have a problem as follows: 50 gallons of gasoline per minute to be delivered at a certain draw-off point.

Pump must be placed on a level 10 feet above the bottom of the storage tank and 20 feet away from the tank.

Discharge pipe must run 400 feet in a horizontal direction and then turn up running vertically 50 feet.

There must be three 90° elbows in the suction line and seven 90° elbows in the discharge line.

By referring to the pump bulletin we find that the No. 1½ pump will just handle this amount of gasoline.

This pump has 1½" suction and discharge connections, so suppose that we base our figures on using 1½" suction and discharge pipes.

By referring to the table at the top of page 4, Bulletin No. 150, we find that the friction in this pipe will cause a loss of pressure of 20.2 feet of head for every 100 feet of pipe. As we have a total of 480 feet of pipe in our suction and discharge lines, this loss of head will amount to 97 feet.

Then by referring to the table at the bottom of the page we find that each elbow will cause a loss of pressure of 0.99 feet, which for ten elbows amounts to 9.9 feet.

We also have a vertical head of 10 feet in our suction line and 50 feet in our discharge line, or a total of 60 feet.

This will give us a total loss of pressure, due to friction and vertical lift between the pump and discharge point, of 166.9 feet.

To convert this feet of head to pounds pressure refer to the table in the center of page 3, Bulletin No. 150. From this we see that 166.9 feet of head are equivalent to about 72½ pounds pressure which we have lost in moving the gasoline from the tank to the discharge point. In order to overcome this loss of pressure the pump would have to be operated at a pressure of 72½ pounds per square inch in order to maintain a delivery of 50 gallons per minute at the discharge point.

As the pump we have selected will not maintain a pressure of over 30 pounds per square inch, it will be seen that we must increase the size of our

pipe or we will not obtain the maximum delivery of the pump and will probably break the pump or burn out the motor.

Of course a little experience will soon teach us the proper size of pipe to start figuring with.

To make our explanation clear, suppose we base our figures on using a 3" suction line and a 3" discharge line, reducing these pipe sizes at the pump connections. Our calculations would work out as follows:

Length of 3" suction pipe.....	30.0	feet
Length of 3" discharge pipe.....	450.0	"
Total length of suction and discharge pipe	480.0	"
Vertical lift in suction pipe	10.0	"
Vertical lift in discharge pipe	50.0	"
Total vertical lift in suction and discharge pipe	60.0	"
Loss of pressure in feet of head due to friction in 480 feet of 3" pipe @ 0.98 per 100 feet	4.70	"
Loss of pressure in feet of head due to friction in ten 3" 90° elbows at 0.08	0.80	"
Total suction and discharge head in feet, including vertical lift.....	65.5	"

65.5 feet equals 28.4 pounds loss of pressure or pressure required at the pump to deliver 50 gallons of oil per minute at the discharge point. Therefore, it will be seen that 3" suction and discharge pipes would be satisfactory for use in this installation.

The above information will also enable you to select the proper horsepower of electric motor. It will be seen that a 3 H. P. motor would be the proper size to drive this pump.

Of course if the oil is to be maintained at a definite pressure of say 10 pounds per square inch at the discharge point, as is required in some oil burning installations, this pressure must be added to the loss of pressure due to friction in the pipes in order to obtain the pressure under which the pump must operate.

In the above calculations, in order to clarify our explanation, we have considered that the suction and discharge pipes are the same size. In some installations it is advisable to make either the discharge or suction line larger than the other. In such cases the loss of pressure for each line must be figured separately and the totals added to obtain the total loss of pressure, or, in other words, the pressure under which the pump must operate to perform the duty for which it is selected.



Wayne Oil Storage Systems

BULLETIN No. 25



This bulletin has been prepared with a view of helping those who wish to plan an Oil House or Oil Room but lack a starting point.

The plans have been selected from actual installations. While no two plants in the same class of industry will use equal amounts of oil, we have selected those plans which we consider will meet the average requirement.

We will be glad to furnish without obligation to prospective customers enlarged blue prints of any of these plans. We can also supply individual bulletins showing our different items of equipment in detail.

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Railroad Oil House

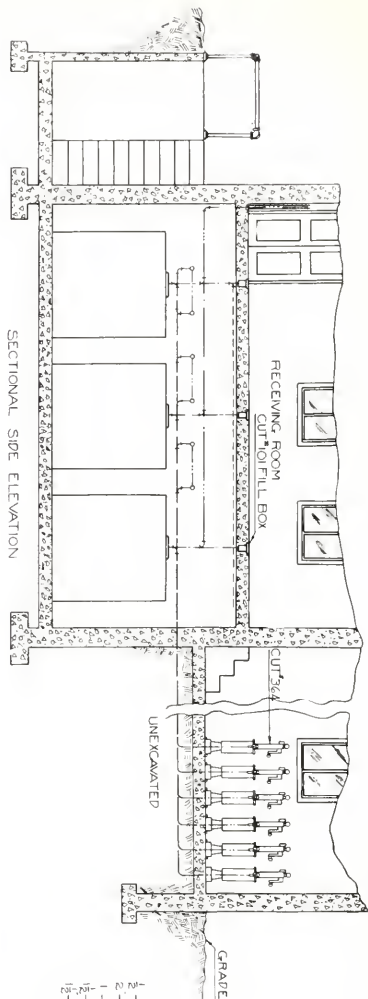
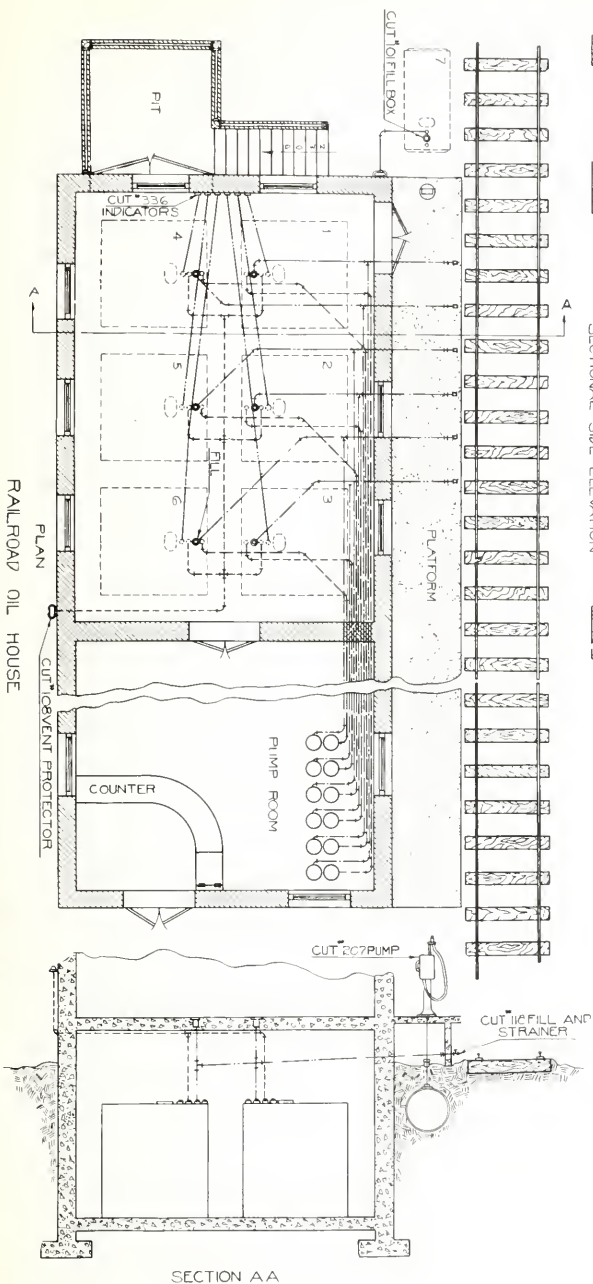
Most railroads adopt a standard design of Oil House, building it large or small, depending on the number of kinds and amount of oil to be handled.

Drawing No. 5212-D shows the design of such an Oil House built to store and distribute six kinds of oil and motor car gasoline. The storage tanks, with the exception of gasoline, are placed in a basement with a pit constructed at one end so that future tanks may be added, provided space has been left for them. In this basement are six Type S Tanks of 5,000 gallons capacity each. The oils stored are Signal Oil, Valve Oil, Car Oil, Engine Oil, Fuel Oil and Kerosene. If the basement is not heated, the tanks containing the heavier oils should be equipped with steam coils to facilitate the pumping of the oils in cold weather.

Two fill lines are provided for each tank, one directly above the tank for emptying barrels and one under the platform at the siding for unloading tank cars. Cut 336 Wall Indicators are connected to all tanks with the indicator board located in the store room above the tanks. A small pump room is partitioned off at one end of the building and is equipped with six Cut 364 gallon stroke pumps. This room is also used to issue the supplies that may be kept on the first floor of the oil house.

A Type A tank is located underground at one end of the platform to store motor car gasoline. A Cut 207 gallon stroke measuring pump is mounted on the platform with its suction line connected to this tank. The motor cars can be filled direct from this pump.

The drawing shows the proper pipe layout for this installation. All suction lines should have at least a 1% fall in their lateral run from the pumps to the tanks and be free from air-traps.



PIPE SIZE AND SYMBOL	
INDICATOR	INDICATOR
FILL	FILL
VENT	VENT
HEADER	HEADER
RETURN	RETURN
CRIP	CRIP
SUCTION	SUCTION

Paper Mill Oil House

A Paper Mill uses a large variety of oil and because of the ground ordinarily covered by the buildings that go to make up a paper mill, a separate oil house is desirable. In the Oil House illustrated, provision is made for the storage of other supplies than oils.

The basement plan shows 12 Type S storage tanks of various sizes. This basement should be heated in the winter so that the heavier oils will pump freely. If desired, steam coils may be placed in any of the tanks if flanges are provided for this purpose when the tanks are constructed. An area way is provided outside of the basement so that additional tanks may be added in the future. A paint agitator tank is provided for the mixing of asphaltum paint and thinner. The agitator in this tank is belt driven from an electric motor mounted on the wall.

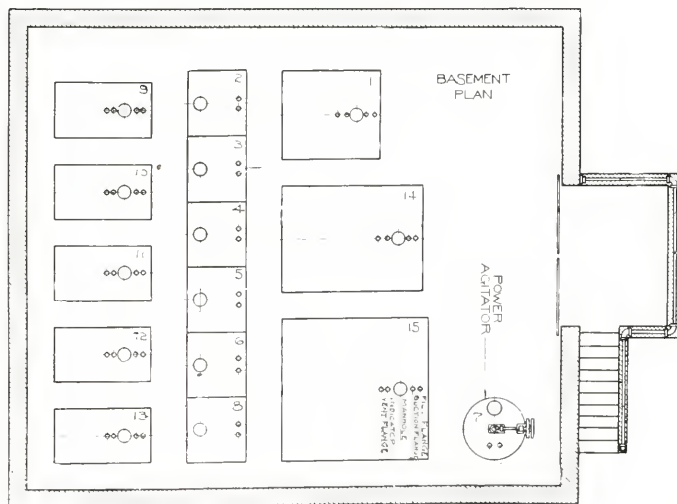
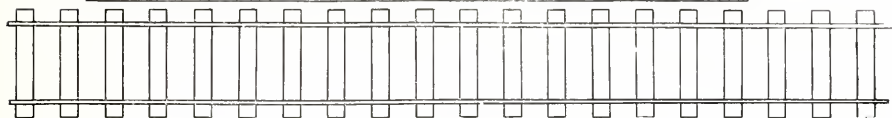
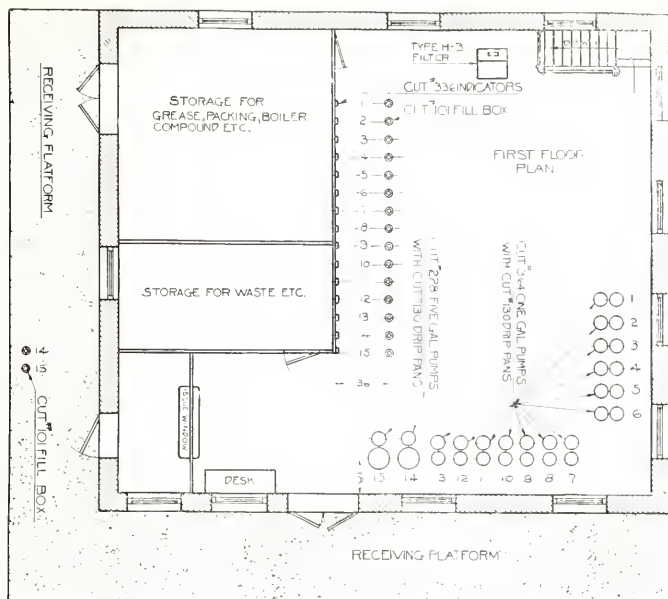
On the floor of the oil house are located fifteen measuring pumps. The two used respectively on foam and engine oil are five-gallon stroke pumps and the balance are one-gallon stroke. Meters are provided on all pumps so that a record of the quantity of oils used may be kept.

There are 15 Cut 101 Fill Boxes countersunk in the oil house floor for emptying barrels in connection with a Cut 100 barrel drainer. One fill box is connected to each tank. In addition, No. 14 and 15 tanks have fill boxes located in the receiving platform so that tank wagons can make dump delivery of the oils contained in these tanks. Cut 336 Wall Indicators are provided for each tank so that the contents of the tanks can at all times be seen from the oil house floor.

A Type H small Batch Filter is a part of the Oil House Equipment. This filter is used to reclaim oil from ring oil bearings throughout the plant.

Schedule of Tanks

- No. 1—14 barrel, 3 16 inch Type S—Winter Black Oil.
- No. 2— 5 barrel, 14 gauge, Type S—Motor Oil.
- No. 3— 5 barrel, 14 gauge, Type S—Turpentine.
- No. 4— 5 barrel, 14 gauge, Type S—Linseed Oil.
- No. 5— 5 barrel, 14 gauge, Type S—Wood Alcohol.
- No. 6— 5 barrel, 14 gauge, Type S—Thread Cutting Oil.
- No. 7— 2 barrel, 3 16 inch, Type V—Asphalt Paint.
- No. 8— 5 barrel, 14 gauge, Type S—Soluble Oil.
- No. 9—10 barrel, 3 16 inch, Type S—L. P. Cylinder Oil.
- No. 10—10 barrel, 3 16 inch, Type S—Pump Cylinder Oil.
- No. 11—10 barrel, 3 16 inch, Type S—H. P. Cylinder Oil.
- No. 12—10 barrel, 3 16 inch, Type S—Machine Oil.
- No. 13—10 barrel, 3 16, inch, Type S—Calendar Oil.
- No. 14—20 barrel, 3 16 inch, Type S—Foam Oil.
- No. 15—50 barrel, 3 16 inch, Type S—Red Engine Oil.



PAPER MILL OIL HOUSE
5218-D

Large Factory Oil House

This Oil House was designed for a factory manufacturing machinery and small metal parts. Underground carload storage is provided for machine oil, kerosene and paraffin oil. In the basement of the oil house is a battery of ten Cut 82 two-barrel tanks for miscellaneous oils. This battery is equipped with barrel track for emptying barrels. There are also two 1,000-gallon tanks for lard oil and quenching oil. These tanks may be filled either from the basement or from the Cut 101 fill boxes located in the floor of the oil house. An outside stairway to the basement is provided, which is large enough to allow for the placing of future tanks.

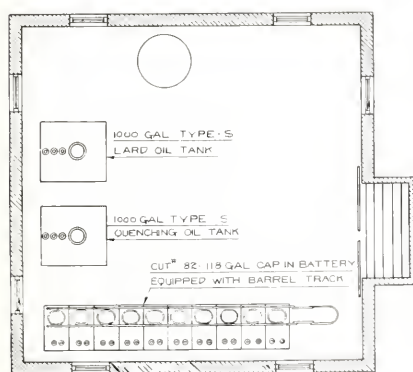
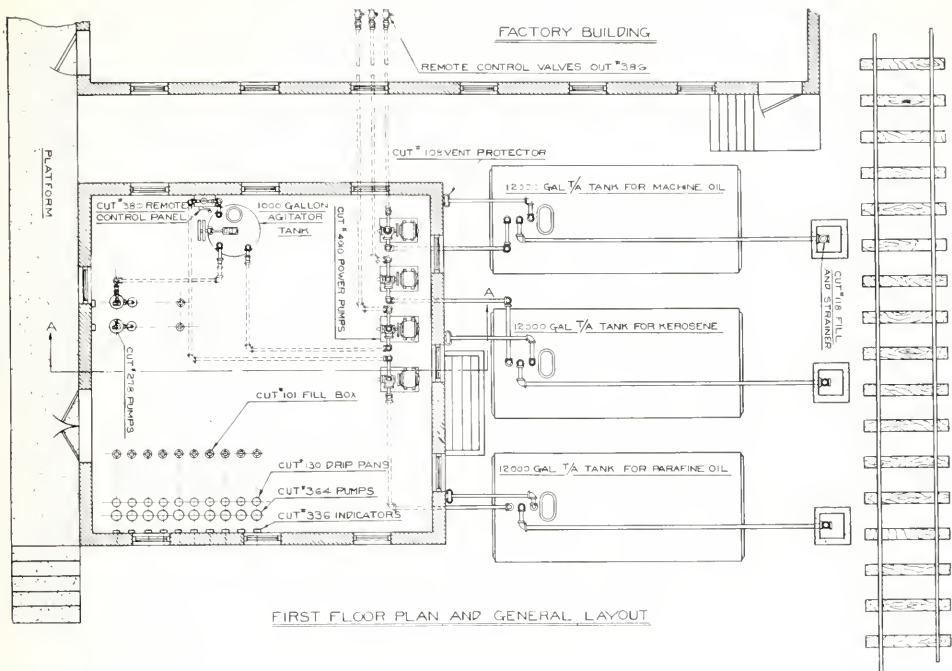
There are 10 Cut 364 gallon stroke pumps located on the floor of the oil house and connected to the 10 Cut 82 storage tanks. The two 1,000-gallon tanks are equipped with Cut 278 five-gallon stroke pumps.

Countersunk in the floor of the oil house is a 1,000-gallon power driven agitator tank used for compounding cutting oils. The five-gallon oil pump discharges into this tank for the measuring of the lard oil content of the cutting oil.

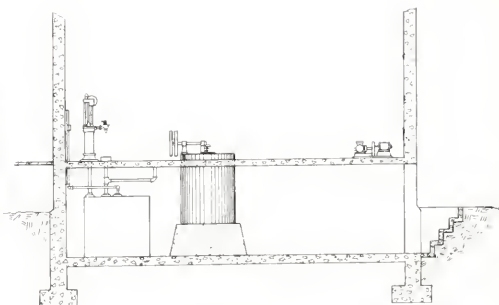
Connected to the outside paraffin oil tank is a Cut 4010 power pump, and controlling the discharge of this pump into the cutting oil mixing tank is a Cut 380 Remote Control Panel. This panel consists of a valve actuated oil switch, meter, strainer and air release. This panel allows the pumping of a definite amount of paraffin oil into the agitator tank.

There are three Cut 4010 power pumps provided to distribute the finished cutting oil, kerosene and machine oil to the factory. Cut 386 remote control valves are located where these oils are used in the factory and the power pumps may be operated and the oil drawn by simply opening one of these valves.

The building of this oil house and the installing of its equipment will constitute one of the greatest economies a large factory can make in the saving of oils and the labor in their distribution.



BASEMENT PLAN



SECTION A-A

FACTORY OIL HOUSE

Oil and Chip House

It is often possible in a large factory to make one building serve as a combined oil and chip house. In the accompanying drawing we show a plan that has been very satisfactorily worked out.

The chips are brought to the Chip House from the Machine Department of the factory in oil tight trucks. These trucks are run on to the elevator and lifted to the third floor of the chip house. The chip separator is of large size, holding 12 bushels of chips, and is counter-sunk in the floor so that the chips may be dumped into it by gravity from the trucks. As the oil leaves the separator, it flows by gravity into a Type B Cutting Oil Filter. Here it is thoroughly cleaned of all fine metal, scale and dirt so that it can go back to the screw machine in as good a condition for reuse as when new. From the clean oil compartment of the filter the cutting oil drains by gravity to a Cut 35 outfit located on the oil room floor.

The dry chips are lifted from the separator by an electric hoist mounted on a monorail. This monorail extends over a number of slanting bottom chip storage bins. The chips are dumped into these bins and when a carload is accumulated they are allowed to run by gravity into a car for shipment.

Underground, outside of the oil house, are located two 10-000-gallon Type A storage tanks for paraffin oil and gasoline. There is also a 1,000 gallon tank for machine oil. One-gallon stroke Cut 364 pumps are connected to these tanks and located in the oil room. The oil room also contains a battery made up of two 2-barrel Cut 65 outfits and two 2-barrel Cut 71 outfits. This battery is complete with barrel track, barrel dash, cradle and chain hoist for emptying barrels by gravity. The two Cut 65 outfits are for soluble and quenching oil and the Cut 71 outfits are for linseed and turpentine.

Rags and kindred supplies are also stored on the first floor and issued on requisition with the oil.

A Cut 227 Lubricating Oil Wheel Tank is used to return the filtered cutting oil to the Machine Shop.

Agitator outfits may be added for the mixing of paraffin oil with base oils for making cutting oil and for mixing soluble oil and water for making cutting compound.

The size of the building depends on the amount of chips to be stored, as practically all but the first floor is taken up by bins.

Equipment for Paint Room

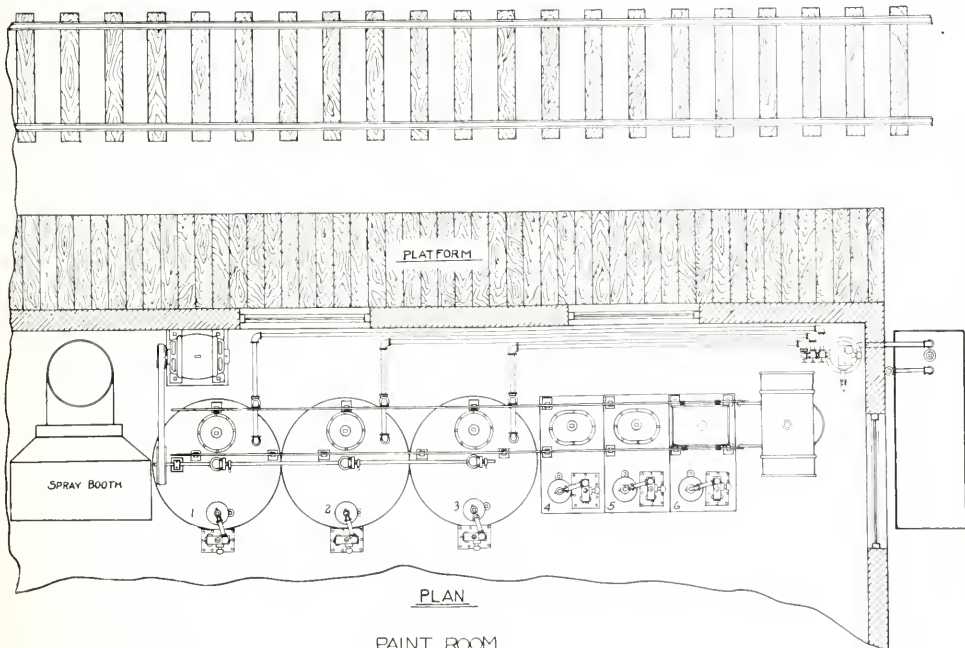
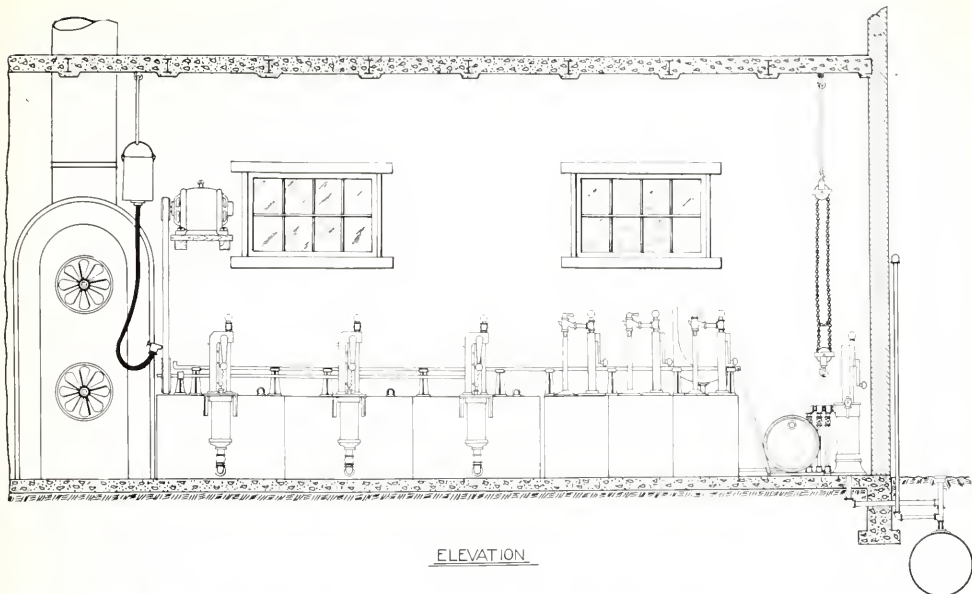
By the use of properly selected Wayne Equipment, the Paint Room in any factory can be kept clean and paints, varnishes and paint oils can be saved from loss by spillage and oxidation.

The plans on the opposite page show a typical installation used in connection with the spraying of paints and varnishes. There are three power driven Cut 328 agitator tanks for mixing enamels and fillers. A common drive shaft is used and each agitator is provided with a clutch so that only the desired liquid need be mixed.

The agitator tanks are cylindrical in shape to secure a complete mixture and are provided with agitator blades and baffle plates to suit the particular liquid. Each of these tanks is equipped with a one-gallon stroke Cut 360 pump for withdrawing the mixture in measured quantities without overflowing the buckets or spray cans.

The three rectangular outfits are Cut 71 outfits and provide safe evaporation-proof storage for paint oils and varnishes. The agitator tanks and Cut 71 outfits have a barrel track extending their entire length. This, in connection with the barrel dash, cradle and chain hoist, make possible the emptying of drums and barrels by gravity and eliminate loss from liquid left in the barrels.

The thinner is stored underground outside the building in a Type A tank where it is safe from fire and will not be lost by evaporation. The pump connected to this tank is a five-gallon stroke Cut 278. The discharge of this pump is connected to a header so that measured quantities of the thinner may be pumped directly into any agitator tank.



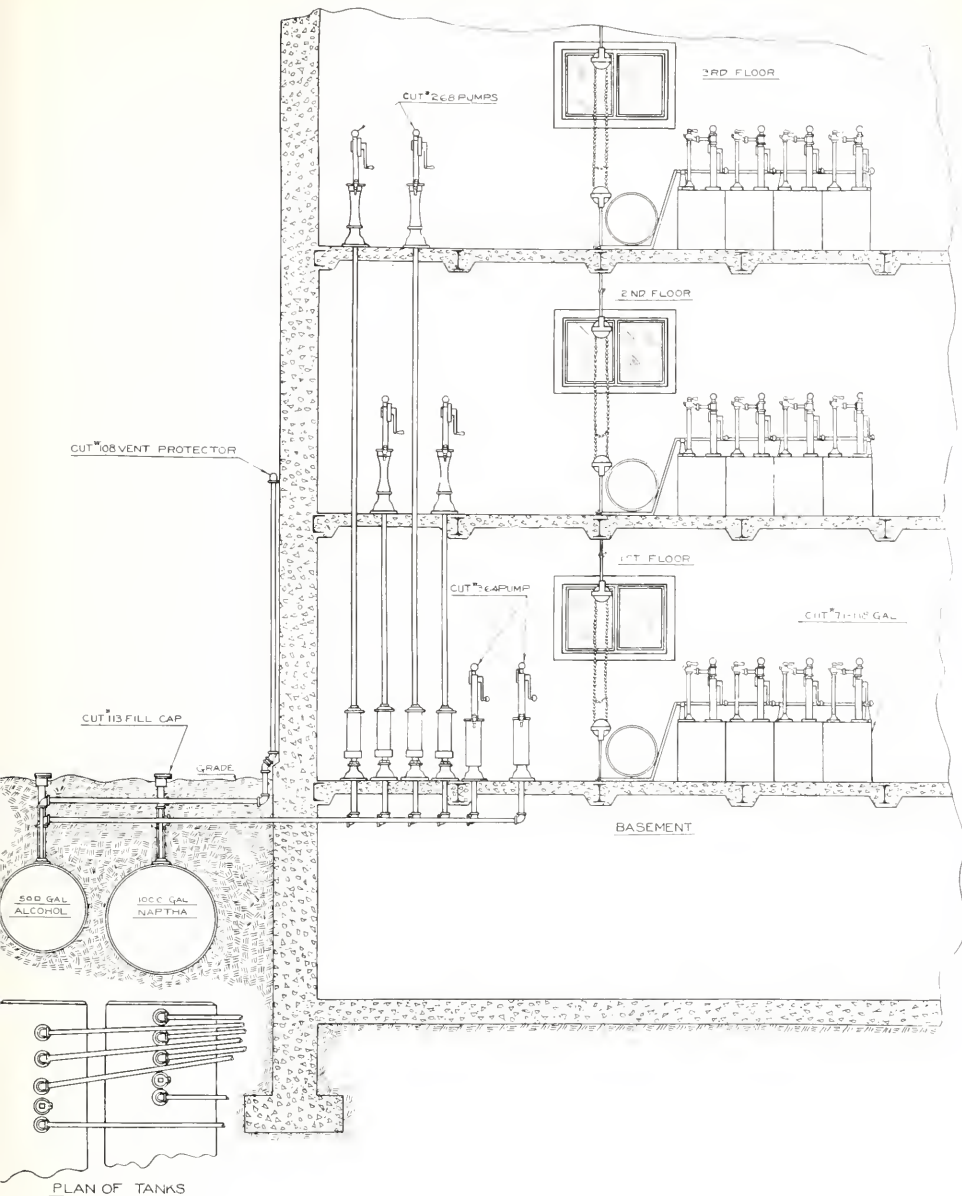
Storage and Distribution for Furniture Factories

Furniture factories are generally multiple story buildings with different painting and finishing operations on different floors. From the nature of this business, it is of the utmost importance that paint oils, varnishes and thinners be stored in a safe manner and also free from loss by oxidation.

It does not pay to keep a drum or barrel of alcohol or naphtha on each floor as is often done. Neither is it profitable to store varnish or oils in barrels on the different floors. In the plan on the opposite page, we have stored the alcohol and naphtha underground in Type A tanks where they are safe and free from loss by evaporation. These liquids are distributed to the first floor of the factory by means of Cut 364 pumps and to the upper floors by Cut 268 drop cylinder pumps. The cylinders of these pumps are placed within 12 feet vertically of the bottom of the tanks and the pumps must be directly above the cylinders on the upper floors. A separate suction line must be run to each pump and extra flanges are provided on the underground tanks for this purpose.

On each floor is located a battery of Cut 71 outfits for the storage of semi-volatile oils and varnishes. These outfits should be of a size sufficient to take all of the oil as soon as it is received. The Cut 71 outfits and the Cut 364 and 268 pumps may be equiped with meters for checking the consumption and keeping departmental costs. The battery tanks can be equipped with agitators and can be made with tin lining when the liquids to be handled so require.

While this layout was originally designed for a furniture factory, it is also suitable for any other factories doing a considerable amount of paint and varnish finishing.



OIL AND PAINT STORAGE IN FURNITURE FACTORY

5216-D

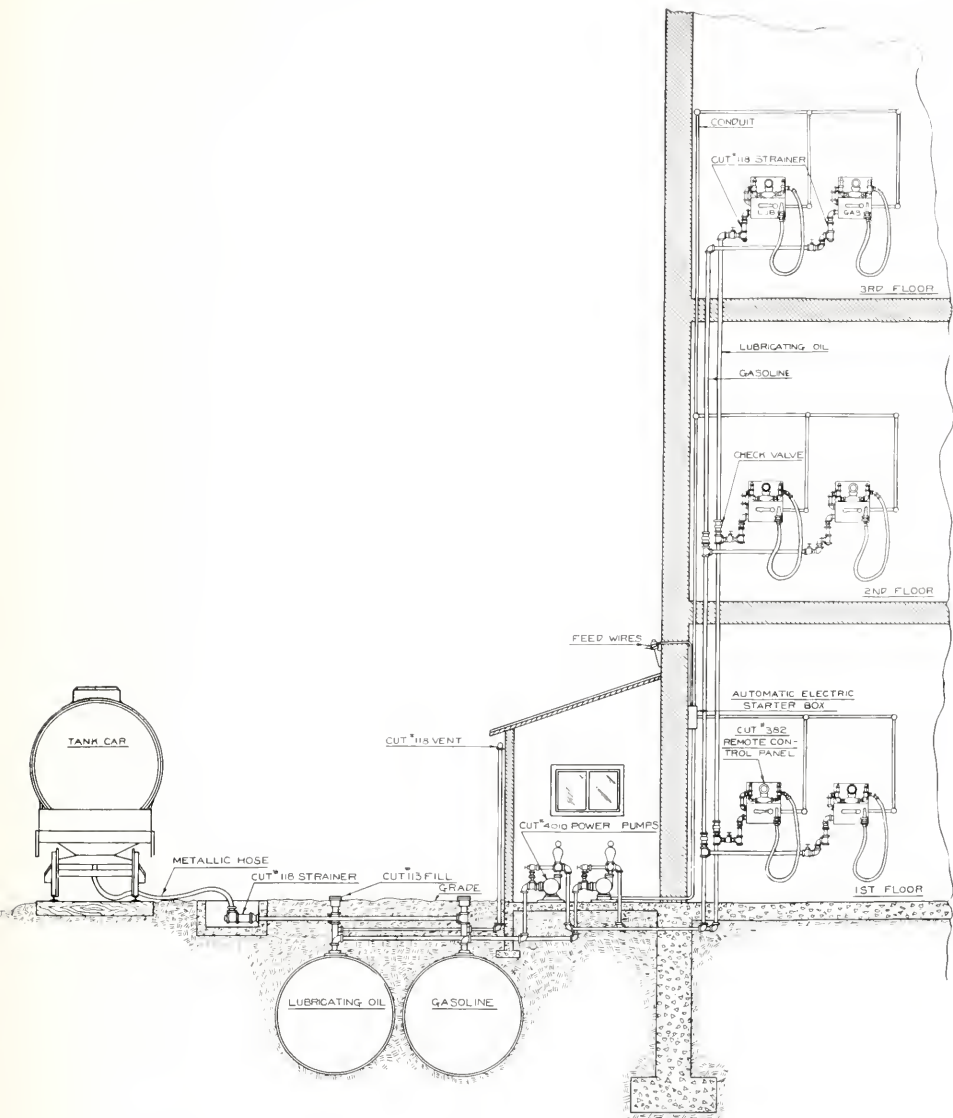
Remote Control System for Automobile Factories

This installation permits of the purchase of motor oil and gasoline in tank cars and its storage and power distribution by remote control. The tank cars are unloaded by gravity to 10,000 gallon Type A underground storage tanks. Cut 118 Strainers are placed in the fill line to the tanks to protect them from any dirt that may be in the tank cars.

The oil and gasoline are pumped from the underground tanks by means of two Cut 4010 power pumps located in a small pump house. Each pump is direct connected to an electric motor. Cut 382 Remote Control Panels are located at the different points in the factory, such as the final assembly line, motor test blocks and dynamometer rooms. By means of these panels and the power pumps, oil and gasoline are available in measured quantities when and where they are needed.

The remote control panel consists of a discharge valve which actuates an oil switch in the pilot line of an automatic starter in the electric motor feed line. When this valve is open, the circuit is closed and the pumps are started. When the valve is closed, the circuit is broken, stopping the pump. Each pump is provided with a by-pass, air chamber and relief valve to protect it from the shock of the closing of the discharge line. On top of the cabinet is located a flow meter which insures the drawing of accurately measured quantities of oil or gasoline. Each meter is protected by an air release valve which will take any air out of the line before it reaches the meter. Only a solid stream of liquid flows through the meter so that its measurement will be accurate.

The installation of this equipment pays for itself in a short time in the labor saving item alone.



REMOTE CONTROL SYSTEM FOR AUTOMOBILE FACTORY

5213 P.

Factory Oil Storage

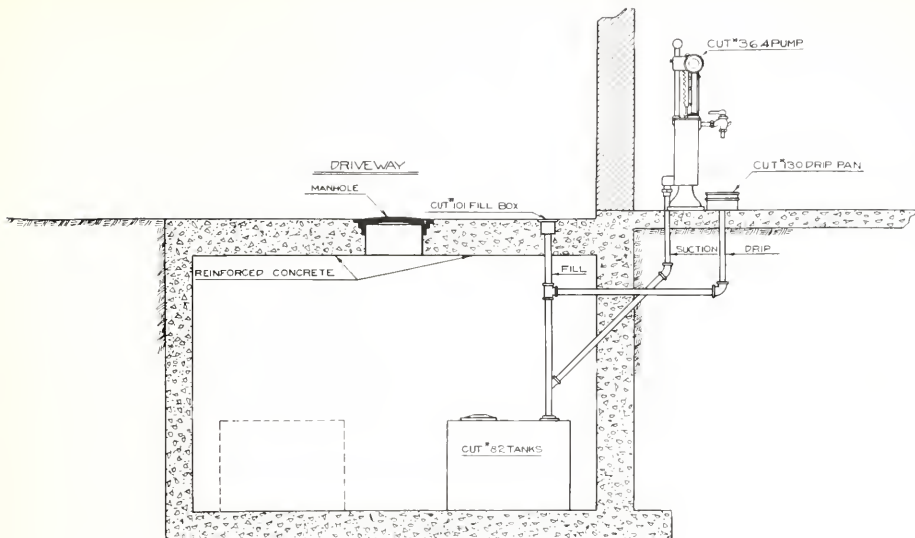
Drawing 5215-D illustrates a popular method of factory oil storage where space is limited. It is often the case that a factory has no basement where tanks can be placed and no ground outside the building save a driveway. An excavation is made in the alley or driveway, concrete floor and sides built and after the tanks are placed the driveway is rebuilt, using reinforced concrete for the roof of the oil room. An opening covered by an iron trench plate should be left in the driveway so that it will be possible to get to the tanks should occasion require.

In this layout our standard Cut 82 outfits are used. This outfit consists of a Type S rectangular tank, Cut 364 one-gallon stroke pump and drip pan. The tanks are placed in the pit and the pumps and drip pans inside the factory along the wall. Cut 101 fill boxes are imbedded in the driveway and connected to the drip pan return lines. The tanks can be filled through these fill boxes or through the drip pans. The pumps are standard with locks and keys so that the oils may be under the supervision of one man and issued only on requisition. We can also furnish 100,000-gallon meters on all pumps so that a check can be kept against the requisitions and weekly or monthly consumption of oil.

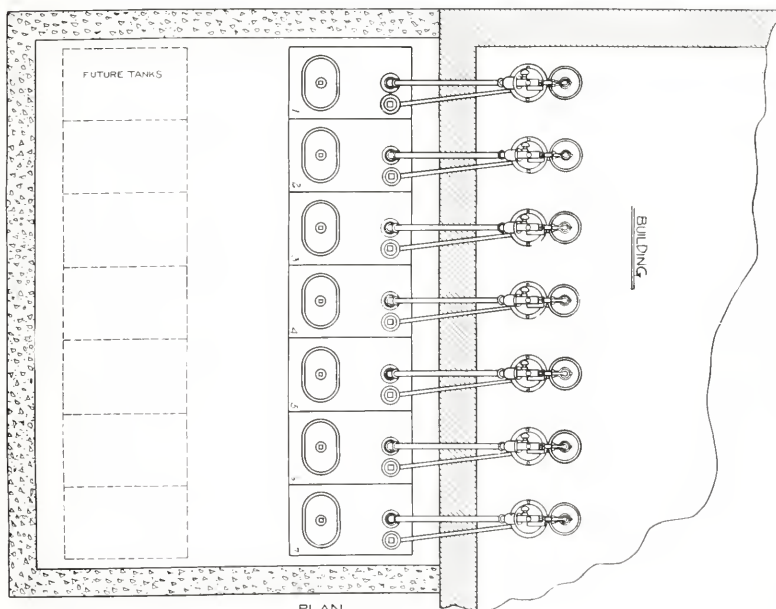
The space required for the battery of tanks is fourteen feet six inches long by forty inches wide by thirty inches high.

Schedule of Equipment

- No. 1—two barrel Cut 82—Machine Oil.
- No. 2—two barrel Cut 82—Kerosene.
- No. 3—two barrel Cut 82—Quenching Oil.
- No. 4—two barrel Cut 82—Cutting Oil.
- No. 5—two barrel Cut 82—Motor Oil.
- No. 6—two barrel Cut 82—Soluble Oil.
- No. 7—two barrel Cut 82—Turpentine.



ELEVATION



PLAN

FACTORY OIL HOUSE

5215-D

Oil Storage Battery in Stock Room

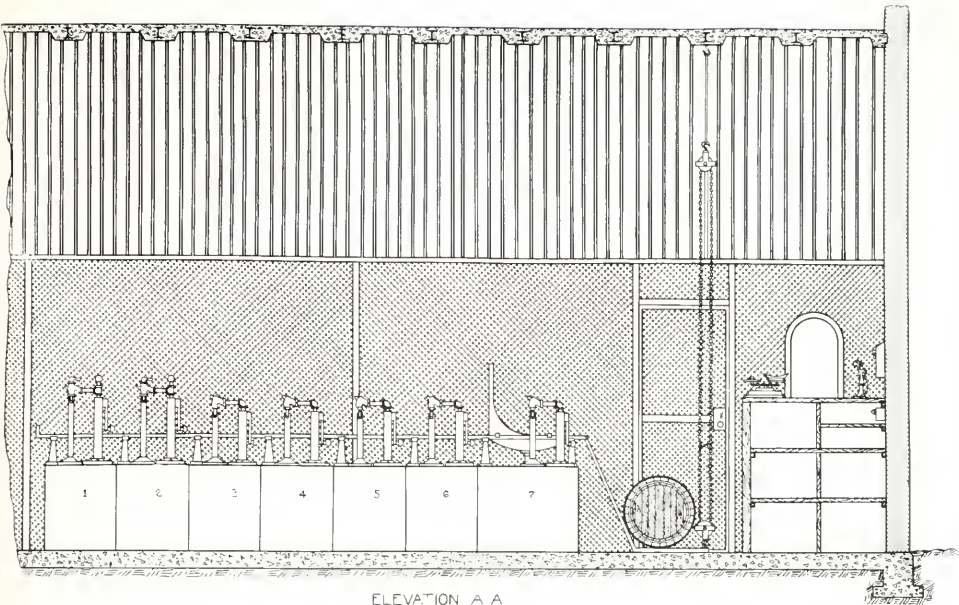
This is perhaps the most popular manner of oil storage when the quantity of any given oil used is not large and the floor space is available. The outfits used are Cut 71 and Cut 65 battery outfits with self-measuring pumps. Oil can be dispensed on requisition in accurately measured quantities without spilling or running over of containers. The battery is equipped with barrel track, barrel drainer, cradle and chain hoist so that drums and barrels can be elevated and drained by gravity into any tank. By this means of draining no oil is left in the barrels and they can be returned at once for credit.

The outfits used should contain at least a month's supply of oil, unless the oil is purchased locally. The smallest size in which these battery outfits are made is 120 gallons. The barrel track cannot be placed on a smaller tank. Outfits No. 1 and 2 are Cut 71 outfits. They are evaporation-proof and are for the safe storage of turpentine and linseed oil without loss from evaporation or fooms and fads. The remaining outfits are Cut 65 lubricating oil outfits.

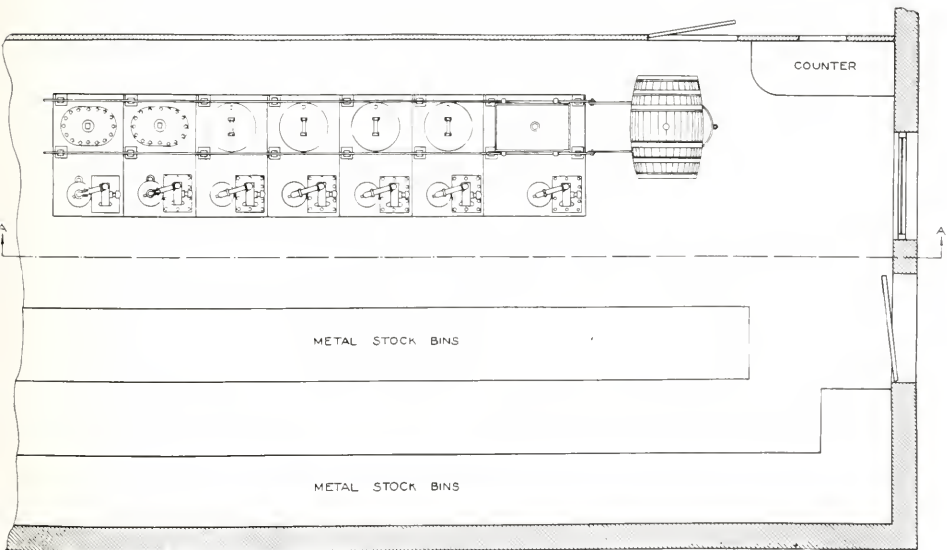
The battery occupies a space fourteen feet long by forty inches front to back.

Schedule

- No. 1—two barrel Cut 71—Turpentine.
- No. 2—two berral Cut 71—Linseed.
- No. 3—two barrel Cut 65—Cutting Oil.
- No. 4—two barrel Cut 65—Soluble Oil.
- No. 5—two barrel Cut 65—Motor Oil.
- No. 6—two barrel Cut 65—Air Compressor Oil.
- No. 7—two barrel Cut 65—Machine Oil.



ELEVATION A A



PLAN

OIL STORAGE BATTERY IN STOCK ROOM
5211-D



Storage Systems for Lubricating Oils

In Garages, Mills, Shops, Oil Houses, Etc.

BULLETIN No. 29



Cut No. 29

This Wayne storage cabinet is designed for storing lubricating oils in garages, factories, mills, engine rooms and railroad oil houses. The cover practically eliminates dust, it locks, preventing oil being drawn by unauthorized persons, and where this equipment is used the fire risk is reduced to the minimum.

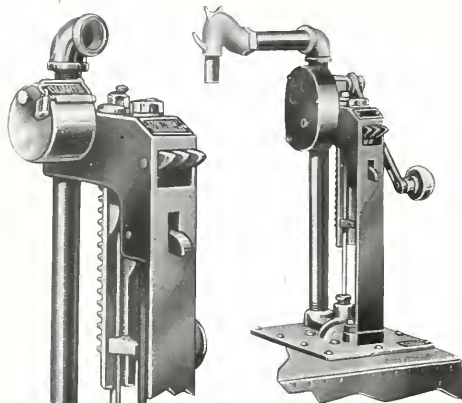
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Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

General Description Cut No. 29



Showing Quart Meter

Back Geared For Heavy Oils

The Wayne Cut 29 adjustable measure cabinet is especially suitable for the storage of lubricating oils in garages, filling stations and engine rooms, etc. It is built entirely of metal, is equipped with lock so that oil cannot be drawn by unauthorized persons, and will keep the oil clean and free from dust.

The self-measuring pump delivers exact quantities up to one quart. It eliminates the untidy condition usually found where oil is handled by the old method, is built of heavy gauge galvanized steel and will last practically a lifetime.

The Cut 29 is extensively used in factories where the central oil supply is located some distance from where the oil is used. It will save time of the employees going to and from the central oil station, and can be placed in the most convenient position adjacent to machine or group of machines.

The pump will discharge one quart, one pint or one-half pint at a stroke, and there will be no waste, leakage, soiling of hands in drawing oil or contamination of the oil by dirt, lint or grit.

Construction: This equipment is built entirely of metal—the best of its respective kinds—and is designed for handling oil in the most improved manner.

Standard Cut 29 Equipment

Tank: The tank is built of high grade, galvanized tank steel. It is carefully spot welded. All seams are flushed with solder from inside to out. All openings are reinforced, making the tank very substantial and of rigid construction.

The Cabinet, enclosing the entire top of the tank, is made of heavy gauge steel and is strong and rigid.

The steel cover folds back as shown in cut. When closed it is dust-proof; it locks, preventing the oil being drawn by unauthorized persons, and an exact record can be kept of the oil dispensed.

Pump: The pump used with this equipment is made of heavy cast iron, steel, brass and aluminum. The valve, stuffing box, etc., are made of solid brass. The measuring cylinder is made of aluminum.

A heavy cast iron cross head holds the discharge pipe in a rigid position. The pump being bolted on top of the tank, allows it to be removed when necessary.

The full stroke of the pump discharges one quart. By setting the proper stop in the pump head a pint or a half pint can be discharged at a stroke. These stops are positive in action and conveniently located.

The discharge pipe terminates in an anti-drip, nozzle (Type D), which instantly stops the flow of liquid when pumping ceases.

Valves: The valves used with this pump are brass of special composition. They are carefully machined and then ground to seat. Each valve is tested and inspected. The accuracy of any measuring pump depends upon the valves. It is therefore especially important that the valves be absolutely tight and the metal of which they are constructed, flawless.

The suction pipe is equipped with foot-valve and strainer.

Finish: The equipment is finished standard in dark green enamel. The pump parts are japanned with nickel trimmings.

Sizes

Capacity	Length Front to Back	Width Front	Height Closed	Height Open
15 gallon.....	16"	19 $\frac{5}{8}$ "	39 "	62 "
20 gallon.....	16"	19 $\frac{5}{8}$ "	40 $\frac{1}{2}$ "	63 $\frac{1}{2}$ "
30 gallon.....	16"	19 $\frac{5}{8}$ "	46 $\frac{1}{2}$ "	69 $\frac{1}{2}$ "
65 gallon.....	22"	24 $\frac{1}{2}$ "	56 $\frac{1}{8}$ "	82 $\frac{3}{8}$ "

Accessories, Transfer Pump Cut 14



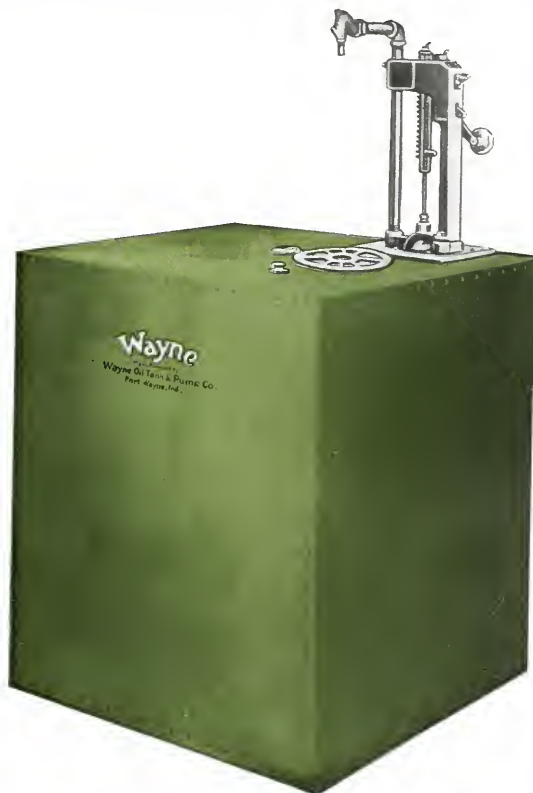
Cut 29—Cabinet Closed



Departmental Oil Storage System for Lubricating Oil

In Factories, Mills, Mines, Railway Shops, Garages, Etc.

BULLETIN No. 35



Cut No. 35—Departmental Oil Storage System

The Wayne Departmental Storage Tank equipment with self measuring pump will be found almost a necessity where lubricating oil is stored or used. It is practically fire proof and will keep the contents clean.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

General Description

The Cut 35 is designed especially for use in garages. Very frequently it is used for the storage of lubricating oils in retail stores, factories, mills, mines and railway shops.

Where a number of different grades of oil are handled a battery of two, three or four are installed. Such systems enable the owner to condense his oil stock in the minimum space, thus saving labor and time in handling.

It is equipped with a measuring pump of half-pint, pint and quart capacity and is easily adjustable. This outfit will not handle gasoline or paint oils.

Tank: The tank is built of high grade galvanized tank steel. It is electrically spot welded. The tank is very substantial and rigid in construction. All tanks above two barrel capacity are thoroughly braced on the inside to prevent bulging or warping.

Pump: The pump used with this equipment is made of heavy cast iron, steel, brass and aluminum. The valves, stuffing box, etc., are made of solid brass. The measuring cylinder is made from aluminum, carefully machined and finished so that an exactly measured quantity is delivered. A heavy cast iron cross head holds the discharge pipe in rigid position. The pump is bolted to the top of the tank and may be easily removed, if necessary.

The full stroke of the pump discharges one quart. By setting the proper stop in the pump head a pint or half-pint can be discharged at a stroke. These stops are positive in action and conveniently located. The discharge pipe terminates in a non-drip nozzle (Type D), which instantly stops the flow of liquid when pumping ceases. This pump is provided with a lock. While the standard equipment is fitted with a quart pump, it can be fitted with gallon pump at extra cost.

Drip Grate: This outfit is provided with a seven-inch drip pan. The drip pan can be locked, preventing unauthorized persons from using the equipment.

Dip Gauge: This gauge shows the amount of liquid in tank.

Finish: The equipment is finished standard in dark green enamel. The pump parts are Japaned with nickel trimmings.

Valves: The valves used with this pump are solid brass of special composition. They are carefully machined and then ground to seat. Each valve is tested and inspected. The accuracy of any measuring pump depends upon the foot valves. It is especially important that the valves be absolutely tight and the metal of which they are constructed, flawless. (These valves are supplied with a brass strainer.)

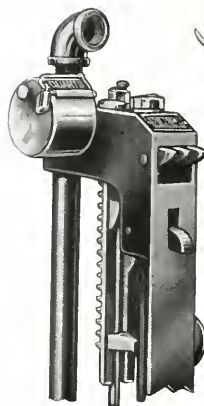
ACCESSORIES

Meter: This pump can be provided with quart meter at an extra cost as shown.

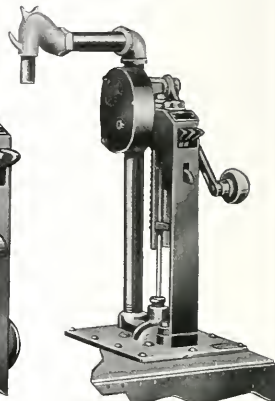
Portable Barrel Drainer: This device is very convenient

for use in connection with Cut No. 35 outfit. (See Bulletin 100.)

Transfer Pump: See Bulletin 100 covering transfer pump to be used in connection with this outfit.



Cut 35
Showing Quart Meter



Cut 35—Back Geared For
Heavy Oils

TANK SIZES—OUTSIDE DIMENSIONS

	Gal.	H.	W.	L.
1 Barrel	67	30"	22"	25"
2 Barrels	129	36"	28"	31"
3 Barrels	184	36"	28"	44"
4 Barrels	236	36"	33"	48"
5 Barrels	289	36"	34"	57"



Standard Cut No. 38 Portable Equipment

Designed for use on curb, in filling station or in factory. Same data as applies on the Cut No. 35. Equipped with steel frame and ball-bearing swivel casters. Can be easily moved from place to place.



Storage Outfit for Lubricating Oils

BULLETIN No. 39



Cut No. 39—Bench Tank

This Wayne outfit is especially designed for storing and handling lubricating oils in small quantities in the factory, garage, etc. It may be used for dispensing glycerine, turpentine, castor oil, etc., in the drugstore.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

General Description

This Wayne outfit is constructed entirely of metal and is especially designed for handling lubricating oils in small quantities. Frequently factories want a small bench can for storing different oils in the different departments. This outfit is particularly well adapted for that purpose. In many cases the druggists have use for a small outfit of this kind for dispensing turpentine, olive oil, glycerine, castor oil, etc. This outfit is adapted for that purpose as well.

The pump is constructed along the same general lines as our larger ones. The valves, measuring cylinder, stuffing box, nozzle, etc., are of solid brass. The tank is made from the best grade open-hearth soft tank steel, galvanized, closely spot welded and all seams flushed with solder. This outfit insures clean oil, proof against fire and waste.

Pump: The pump used with this outfit is constructed entirely of metal. The plunger rod, valves, stuffing box, nozzle, etc., are made of brass. The bracket is so arranged that a heavy cast iron cross head encompasses the discharge pipe, making it very rigid. The pump is attached directly to the tank, as shown in the illustration. This pump is designed to discharge a pint at a stroke. It may be set to discharge a half or quarter of a pint at the option of the operator. The discharge pipe terminates in a non-drip nozzle and is provided with a special reducing tube for bottle filling or for filling hand oilers.

Tank: This tank is made of the best grade open-hearth soft tank steel, galvanized. It is carefully spot welded and the seams flushed with solder. The openings are re-inforced, making it very substantial.

Fill Opening: This outfit is provided with a special 2-inch fill or clean-out opening. This is closed by means of a special screw cap.

Drip Pan and Cover: This tank is fitted with a 6-inch drip pan with a 4-inch opening. The drip pan is attached to the tank and the opening is provided with a fine mesh screen to prevent dirt from returning to the tank when the drip pan is open. This drip pan is provided with a special hinged cover and extension tube which, when in place, encompasses the discharge pipe.

Computer: When specially ordered for a dispensing outfit, this pump will be provided with a computer graduated in ounces, according to the apothecary scale. The maximum capacity of the pump is sixteen ounces. This is especially valuable in filling bottles in the drugstore.

Finish: The tank is finished standard in a dark green enamel; all cast iron parts are finished in black enamel. The nozzle, reducing tube, etc., are nicked.

Tank Sizes:		Inside		Outside
Capacity.		Length.	Width.	Height.
5 Gallons		11"	11"	13 $\frac{7}{8}$ "
10 "		14"	14"	15 $\frac{3}{8}$ "
20 "		17"	18"	19 $\frac{3}{8}$ "
30 "		17"	18"	24 $\frac{7}{8}$ "
50 "		22"	20"	20 $\frac{7}{8}$ "

Equipment: The standard equipment includes tank and pump complete with type "D" nozzle, drip pan with cover, extension tube; also computer when so ordered. The standard finish is dark green enamel, but any other finish will be furnished without additional charge, except white enamel, which is special.

Wayne

Filter for Gasoline

BULLETIN No. 47



Filter, Cut No. 47

This Wayne filter is designed for use in connection with any of the pumps listed in the bulletins except Cuts No. 60 and 62. It is attached to the discharge pipe and when so attached it removes all water and other foreign substances from the gasoline as fast as it is pumped.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

GENERAL DESCRIPTION

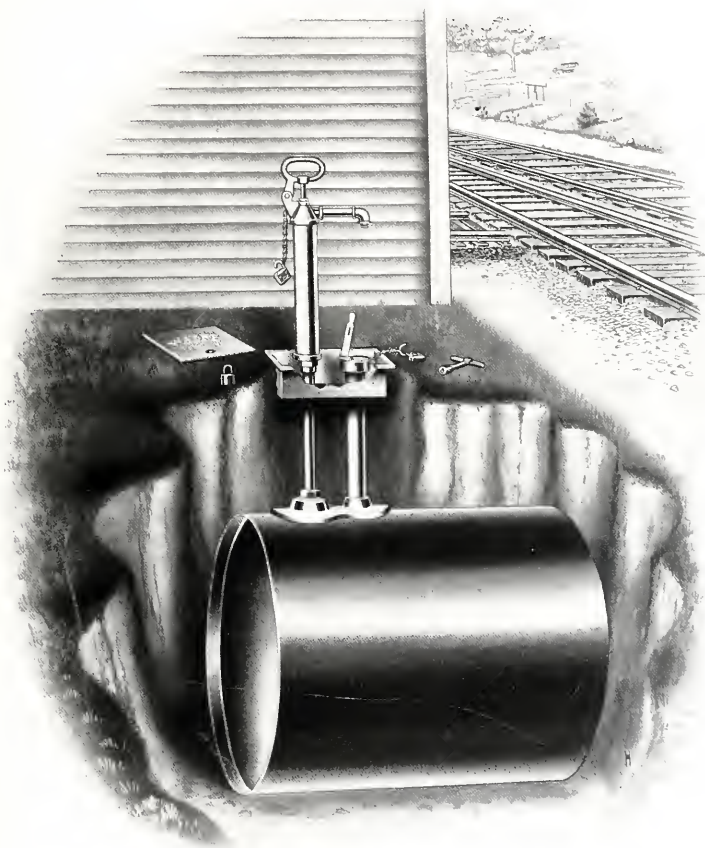
A Wayne filter is constructed in such a manner that the gasoline is forced through two reinforced fine mesh brass screens before reaching the discharge nozzle. These screens are so arranged that the water and other foreign substances are removed from the gasoline. The impurities are held at the bottom of the filter while the clean gasoline is permitted to pass through the screens and out through the discharge nozzle.

Construction: The top and bottom castings used in connection with the Wayne filter are galvanized to prevent rusting or corrosion. A heavy pipe is screwed into the top and bottom casting as shown in the illustration. A drawn brass shell is set into the top and bottom castings and these joints are carefully litharged. The screens are fine mesh brass with heavy reinforcements to prevent their collapse under heavy pressure. The openings from the discharge line at the bottom of the filter are so arranged that the stream of gasoline is broken up before striking the screen. This has a tendency to separate the water and gasoline which is a material aid to the screens in preventing the water and other foreign substances from passing through them. The impurities are retained at the bottom of the filter. These may be drawn off from time to time by closing the discharge nozzle of the pump and opening the draw off cock at the top of the filter. If the dirt and water which will accumulate at the bottom of the filter are drawn off with reasonable frequency, no trouble will ever be experienced. This device insures high grade gasoline, free from water or dirt.



Gasoline or Oil Storage Equipment

BULLETIN 60



Cut 60 Equipment

The Cut 60 unit, consisting of pump and tank, is especially designed for railroad work, installing along the right-of-way, in the section house or signal tower for delivering either gasoline or oil to motor vehicles or motor hand-cars. It is a simple, inexpensive equipment, easily installed, and will keep the liquids clean and pure for an indefinite period.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

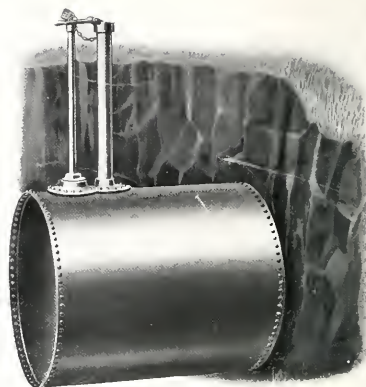
Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

Uses and Advantages

The Cut 60 direct lift outfit is the simplest equipment designed for the purpose of storing and distributing gasoline, kerosene or lubricating oils where small quantities are desired. It can be installed by anyone in a few hours' time; there is nothing complicated about it, and should a change be desired in the location of the tank the pipe and fittings need not even be detached from the tank.

The pump is of the direct lift, non-measuring design. It will discharge about one and one-quarter pints at each stroke and is arranged to detach from the suction pipe, if desired. It weighs only seven pounds, measures twenty-one inches over all and can be carried in the tool box. A heavy metal clasp is arranged to fit over the suction pipe, locking both fill and suction pipe, and prevents the liquid from being drawn by unauthorized persons. It can be equipped with filling hose so that the liquid can be delivered direct into tank or container.

Should you, however, desire the pump to remain on the suction pipe, it may be locked so that the oil cannot be drawn out or the equipment be tampered with in any way. The tank as furnished standard with equipment is usually one, two or three barrel capacity, or 14 or 16 gauge steel.



This cut shows the Direct Lift Outfit with the pump removed and the fill and suction pipes locked out of danger.

The Standard Cut 60 Includes The Following:

Pump: Built of cast iron and steel, has a seamless brass cylinder, brass valves, stuffing box, etc., of the highest grade. Fitted with padlock and two keys and discharges slight over one pint at a

stroke. The valve arrangement drains the liquid back to the tank when pumping ceases. The pump is fitted with detachable connection, allowing it to be taken off in a moment's time if desired. Underwriter labeled.

Tank: Tank as selected.

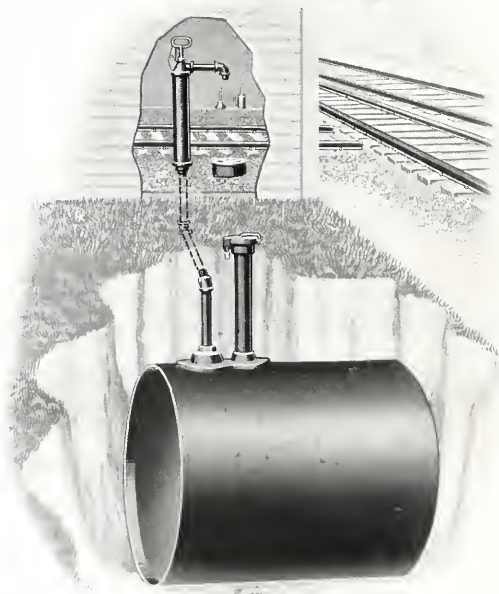
Fill Pipe: 2" fill pipe, 30" long, with vented fill cap which positively prevents evaporation of the liquid and only admits air to take the place of the liquid that is being drawn out. Fitted with inner fill tube, double screen, padlock and two keys.

Suction Pipe: $\frac{3}{4}$ " suction pipe, 30" long, including suction pipe cap to seal suction when pump is detached.

Gauge Stick: Graduated in gallons, to determine the contents of the tank at any time.

Pipe Compound: A can of litharge and glycerine—(insoluble in gasoline or oil) to be used in making points of pipe tight—is furnished with each pump. It quickly sets and when properly used the pipeline will never cause trouble from leakage.

Accessories: Wayne $\frac{3}{4}$ " extra heavy gasoline or oil hose in 7 and 10 ft. lengths.

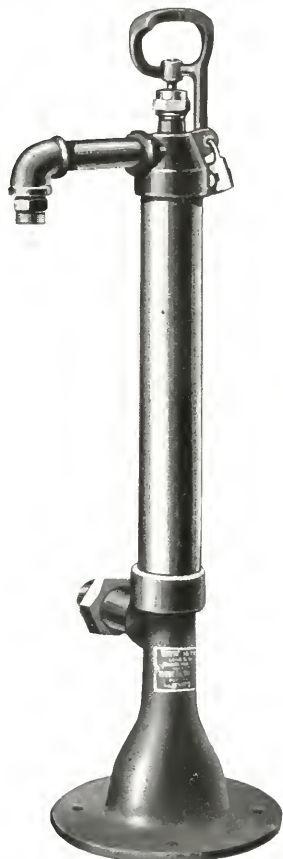


Showing Pump as Installed in Section House



Gasoline Storage Systems for Private Garage

BULLETIN No. 62



Cut No. 62

Long Distance System

The Wayne Suburban Storage Outfits are especially designed for the car owner who does not require an elaborate system.

They are safe, inexpensive and economical.

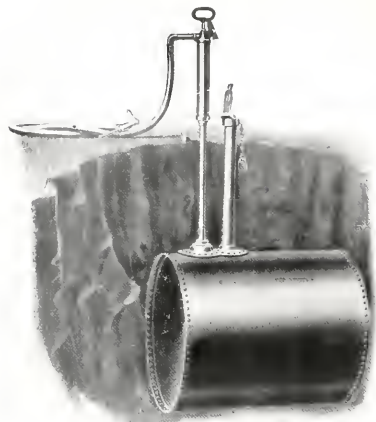
Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

General Description



Cut 60. This shows the Direct Lift Pump ready for operation.

fill pipe cap covers the suction pipe and locks. This outfit may be installed in the yard along the driveway or at the entrance to the garage. The gasoline hose and filling nozzle may be used with it. The outfit affords no obstruction when properly installed and the pump is detached.

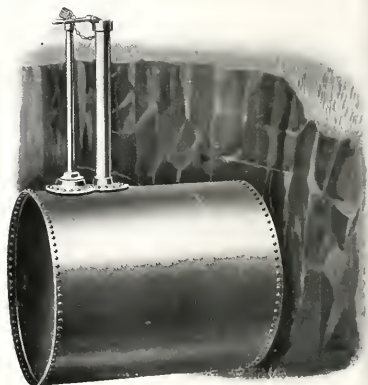
Equipment: The standard equipment includes a pump complete, tank with gauge stick, litharge for laying lines and making connections, fill pipe, suction pipe, vent cap and lock.

Cut 62: Cut No. 62 is the long distance type. The tank is buried, filled and vented outside. The pump is placed in the garage at the most convenient point for filling the car. It is secured in place by four heavy lag screws and stands perfectly rigid. Both the pump and fill pipe cap lock. If the gasoline hose is used, the gasoline may be pumped from the underground tank directly into the car, eliminating evaporation and danger from fire. The height of this pump with plunger down is 27 inches. Height with plunger extended 40 inches. Diameter of base 8 inches. It stands the proper height for easy operation.

Equipment: The standard equipment includes pump complete, underground tank, stick gauge for tank, litharge for making connections, necessary lag screws, fill and suction pipe for tank with stuffing box and union.

(Note: Suction pipe from union to pump not furnished.)

Tanks: All tanks are made of heavy galvanized steel, closely riveted with all seams thoroughly soldered. Each tank is tested under air pressure and then given three coats of asphaltum before shipment, making them leak and evaporation proof. The tanks are provided with special fill pipe inside of which is a removable, fine mesh, brass wire screen strainer. The cap on the fill pipe is fitted with a special vent which operates automatically. Tanks have same dimensions as all standard type "A" tanks. See Bulletin 79 for dimensions.



This cut shows the Direct Lift Outfit with the pump removed and the fill and suction pipes locked out of danger.

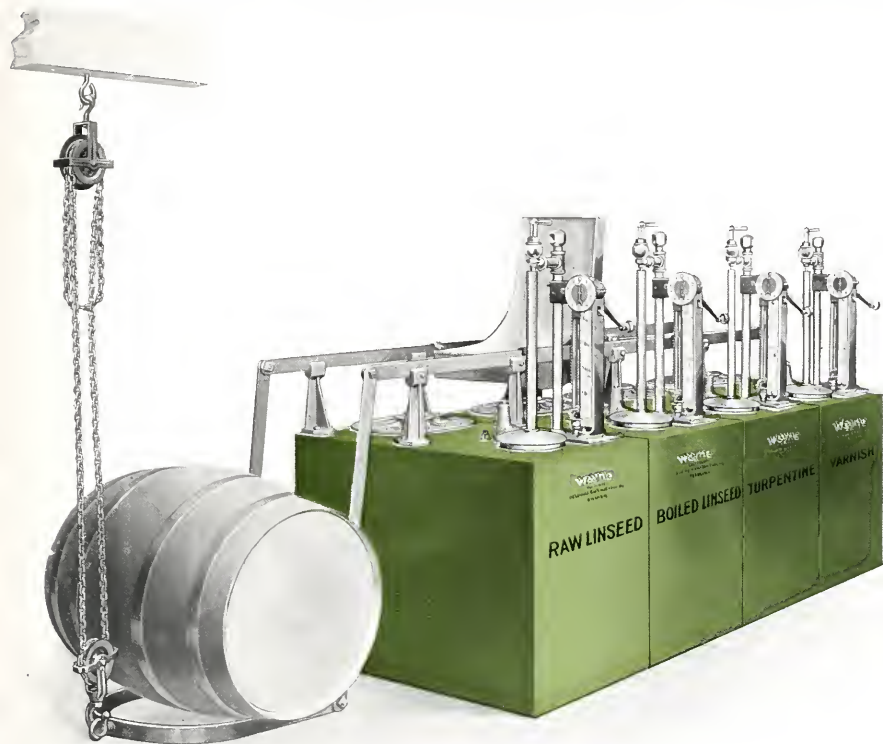


Paint Oil Storage System

For Storage and Distribution of

Linseed Oils, Turpentines, Varnishes, Light Paints, Etc.

BULLETIN No. 71



Cut No. 71—Battery Storage Equipment for Paint Oils

Paint oils, varnishes, etc., must be kept in evaporation-proof containers in order to maintain their original consistency and prevent waste.

Storing these commodities in wooden barrels, facet tanks or iron drums allows their evaporation, contamination with dirt and dust, waste and over-measure, and in the case of linseeds, varnishes and paints allows the formation of "foots and fats," which render these liquids thick and unfit for use.

Wayne Oil Tank & Pump Company

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Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

General Description Cut 71

The Cut 71 battery equipment is made especially for the storage and distribution of paint oils and liquids of a volatile nature.

This equipment is designed on the "air-tight" principle, with bolted type machine faced manhole and ball air vent, and is so constructed as to only admit air to replace the liquid that is being pumped out, instantly sealing the tank when pumping ceases and preventing the formation of "foots and fats," which is a great source of loss where these commodities are stored and handled in cans, barrels, faucet tanks, measures or funnels.

The arrangement of barrel cradle, track and dash affords a means by which the entire contents of either iron drums or wooden barrels may be handled and emptied into storage tanks without spillage or waste and with a minimum of labor, as one man can easily handle the entire job.

Each equipment is fitted with individual dip gauge, providing a check on incoming oil, or contents of tank; measuring pump, providing a check on outgoing oil.

This equipment is furnished standard with gallon pump and expansion chamber. This expansion chamber provides room for the expansion of the liquid in the cylinder due to the changes in temperature. Correct measurements of pints, quarts, half-gallons and gallons, as desired, are obtained by simply moving the quantity stops, built in the head of the pump, allowing the liquid to be correctly measured directly into the customer's container, eliminating the use of funnels or measures.

In factories, mills, oil houses, wholesale and retail stores this equipment will be found the most economical way to store and handle paint oils.

This equipment may be placed where the liquid is used, is practically fire-proof and is built to conform to that measure of safety prescribed by the National Board of Fire Underwriters and is listed under their supervision.

With this system in use, in some instances it is possible to make quite a saving by having oil delivered in bulk.

Construction: Liberally proportioned, strongly and substantially built, the most approved design. Constructed throughout of bronze, steel and galvanized iron and will last practically a lifetime.

Tank: The tank is built of high grade galvanized tank steel plate, carefully spot welded. All seams are flushed with solder from inside to outside. All openings are reinforced, making the tank very substantial and of rigid construction.

Pump: The pump used with this equipment is made of heavy cast iron, steel and brass. The valve, valve seats, stuffing box, plunger rod, etc., are made of solid brass. A heavy cast iron cross head holds the discharge pipe in a rigid position. The pump being bolted on top of the tank, allows it to be removed with ease.

The measuring cylinder is of seamless brass tubing, fitted with solid head and protected by steel tie rods. Pump is equipped with lock.

Valves: The valves used with this pump are solid brass of special composition. They are carefully machined and ground. Each valve is tested and inspected. The accuracy of any measuring pump depends upon the valves. It is therefore especially important that the valves be absolutely tight and the metal of which they are constructed flawless.

Anti-Drip Nozzle with Lever Shut-off is provided with this pump. It instantly stops the flow of liquid when pumping ceases.

Drip Pan: A seven-inch galvanized drip pan, fitted with cast iron grate and equipped with cover and extension tube which fits closely around discharge nozzle when pump is not in use and locks, preventing oil being drawn by unauthorized persons, making the equipment dust, fire and fool proof.

Finish: The equipment is finished standard in dark green enamel. The pump parts are Japanned with nickel trimmings.

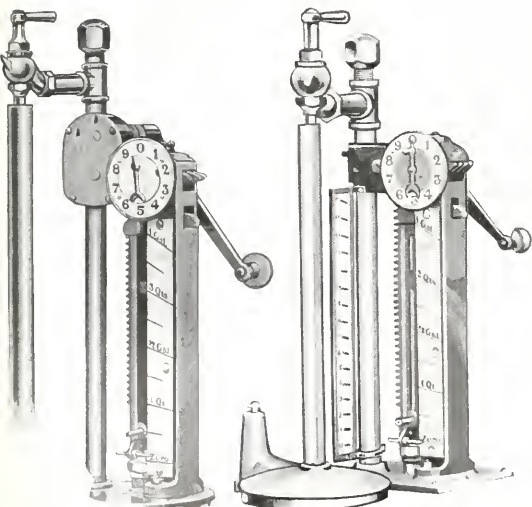
Tin-lining tanks and tinning brass parts of pump coming in contact with the liquid is sometimes necessary where galvanizing causes discoloration of the liquid stored.

In the case of turpentine, while the first liquid stored is slightly discolored, or clouded, this cloud will soon disappear. The turpentine is not injured in any way, but the discoloration may be objectionable where the liquid is sold at retail.

Where tin lining is not specified for tank in connection with the use of turpentine, we will only tin the brass parts of pump coming in contact with the liquid.

Tank Sizes:

	Width Across Front	Length, Front to Back	Height
2 Barrels, 118 Gallons	24"	40"	30"
3 Barrels, 167 Gallons	34"	40"	30"
4 Barrels, 217 Gallons	44"	40"	30"
5 Barrels, 271 Gallons	55"	40"	30"



Detail of Cut 71 Pump Head showing back gearing for heavy oils, quantity scale, ten gallon discharge register.

Detail of Cut 71 Pump Head. Shows ten gallon discharge register, quantity scale and computing scale.



Storage System for Rubber Cement

BULLETIN No. 73



Cut No. 73—Rubber Cement Outfit

The above outfit is especially designed for storing and handling rubber cement or other similar liquids in the different departments. It is a special departmental tank and is not designed for bulk storage of these liquids.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems - Oil Filtration Systems - Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

General Description

This Wayne outfit for rubber cement is constructed entirely of metal and is especially designed for storing and dispensing rubber cement in small quantities in the different departments. It has been made with a full knowledge of the conditions under which the outfit is to be used. The pump is attached directly to the top of the tank and the entire top, including pump, is so arranged that it may be removed with very little trouble. The tank is made of the best grade open hearth soft tank steel, galvanized; is carefully riveted and the seams flushed with solder. The top has a special reinforcing as shown in the illustration. It provides a neat, clean and satisfactory means of keeping rubber cement in the departments for use in the different bench cans.

Pump: The pump used with this outfit is constructed entirely of metal. The valves, plunger rod, stuffing box, nozzle, etc., are made of solid brass. The bracket is so made that a heavy cast iron cross head encompasses the discharge pipe, making it very rigid. The discharge pipe is attached to the top of the tank by means of a special stuffing box arrangement. The pump discharges a pint at a stroke and may be set to discharge a half or quarter pint, at the option of the operator. These quantity stop regulators are placed for convenient operation. The pump is provided with a lock. The discharge pipe terminates in a special lever handle, self-cleaning nozzle. When the nozzle is closed a plunger is extended to the lower edge of the nozzle opening, cleaning it entirely, thus preventing the rubber cement from hardening in the discharge nozzle and clogging it.

Tank: The tank is made of the best grade open hearth soft tank steel, galvanized. The seams are carefully spot welded. The top of the tank is provided with a reinforcing ring to receive a special cast iron cover. This cover is held to the top of the tank by means of hinged bolts and wing nuts. There are four of these, which engage with special slotted bosses on the cast iron cover. If for any reason the top of the tank, including the pump, is to be removed, the operator simply loosens these four wing nuts, throws the bolts down and the entire pump and top of tank may be lifted out. This tank is provided with handles so it may be carried to different points in the shop.

Fill Opening: The tank is provided with a 2-inch fill opening, which is covered by means of a special screw cap.

Drip Pan: The outfit is provided with a special 4-inch drip pan, so arranged that the pipe extends from the opening in same to the bottom of the tank. The lower end of this pipe is fitted with a screen.

Valves: The valves used with this pump are solid brass, all carefully machined and then hand ground. After this care in construction each valve is carefully tested and inspected to insure accuracy.

Finish: This tank is finished standard in dark green enamel; all cast iron parts are finished in black enamel. The nozzle is nicked.

Tank Sizes:

Capacity.	Diameter.	Height.
5 Gallons	14"	15½"
10 "	14"	19½"
20 "	18½"	19¾"
25 "	18½"	22"

Equipment: The standard equipment includes the tank and pump complete with special lever handle nozzle, lock and drip pan. The standard finish is dark green enamel, with all cast iron parts finished in black enamel.

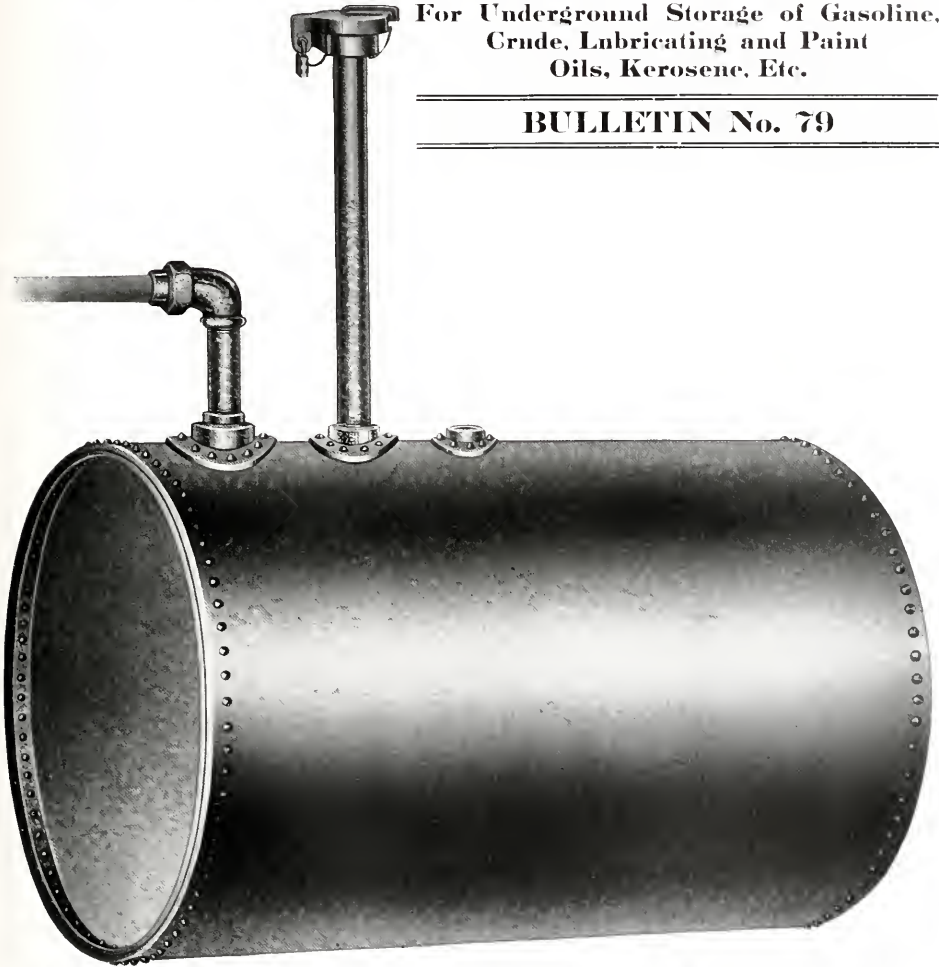
REG. U. S.
Wayne
TRADE MARK

TYPE "A" LIGHT METAL

Cylindrical Galvanized Tanks

For Underground Storage of Gasoline,
Crude, Lubricating and Paint
Oils, Kerosene, Etc.

BULLETIN No. 79



WAYNE GALVANIZED TYPE "A" STORAGE TANKS are built especially for the storage of gasoline and other liquids underground and are of the approved type. Head and shell, as well as all flanges, pipe fittings, stuffing box, etc., are heavily galvanized to withstand the water and other corrosive elements which a tank buried in the ground is especially subjected to, and they will last an indefinite period.

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Illustration below shows actual thickness of 12 and 14 gauge galvanized steel, for your convenience in comparing.

GAUGE

PARTS OF INCH

№ 14



$\frac{5}{64}$

№ 12



$\frac{7}{64}$

DATA ON STANDARD 12 AND 14 GAUGE GALVANIZED STEEL TANKS

Capacity in Barrels	Approx. Capacity Gallons	Approx. Outside Dimensions		Approx. Shipping Weight, Pounds	
		Diameter	Length	12 Gauge	14 Gauge
1	63	27"	30"	175	130
2	120	31"	42"	240	200
5	280	38"	61"	430	350
9	500	38"	109"	690	575
10	550	38"	118"	750	620

Note:—Unless specifically stated on the order, the Company reserves the privilege to ship either a riveted, spot welded or oxy-acetylene welded tank.

THE ABOVE TANK SIZES ARE BASED ON USING STANDARD SHEETS AND HEADS. IF LOCAL CONDITIONS NECESSITATE A DIFFERENT SIZE THAN SHOWN, AN ADDITIONAL CHARGE MUST BE MADE.

THE ABOVE CAPACITY TANKS IN 12 AND 14 GAUGE CAN BE UNDERWRITER LABELED.

STANDARD EQUIPMENT

THE STANDARD TYPE "A" GALVANIZED TANK IS FITTED WITH ONE 1", ONE 2" AND ONE 3½" SPECIAL LONG THREADED GALVANIZED FLANGES, AND INCLUDES 2" GALVANIZED FILL PIPE COMPLETE, FITTED WITH FILL TUBE, TWO SCREENS, VENTED FILL CAP, PADLOCK WITH TWO KEYS AND CAN OF LITHARGE AND GLYCERINE FOR MAKING UP PIPE JOINTS.

ACCESSORIES FOR TYPE "A" GALVANIZED STORAGE TANKS

FOR PRICE ON SUCTION PIPE COMPLETE WITH STUFFING BOX, UNION ELL, FOOT-VALVE, ETC., SEE PRICE SHEET.

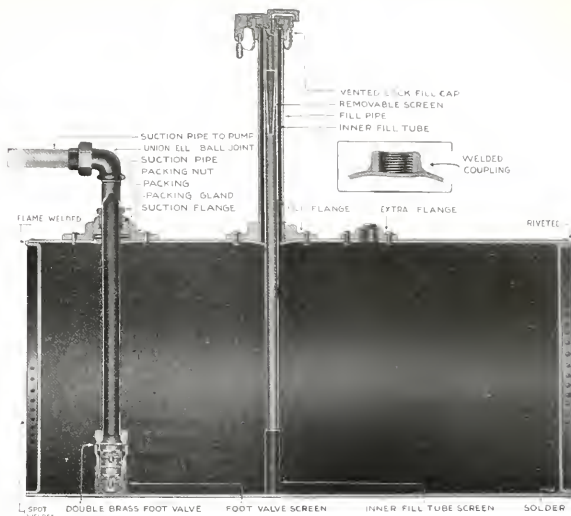
THE ABOVE TANKS CAN BE FITTED WITH 10"x16" BOLTED MACHINE FACED MANHOLE AT EXTRA COST.

Note:—Suction Pipe between Union Ell on top of tank, and Union on base of pump not included. When tank is ordered and no pump—Suction Pipe and Fittings not included.

Thirty years ago this Company built its first galvanized storage tank. Methods, tools and materials have undergone vast changes since that time. Step by step we have corrected and developed this department along improved lines, guided by the service our first equipment is giving our customers.

Our aim is to manufacture a safe, correctly built tank which when installed can be depended upon to give the user no trouble and assure him that regardless of conditions surrounding the installation every gallon of liquid put into the tank will remain clean and pure, will not become contaminated by foreign matter, and that there will be no evaporation or leakage during the entire service of the equipment, which is practically a lifetime.

Gasoline is one of the most difficult liquids in common use to store. Its penetrating power is so great that tanks for storing it must be made with much more care than for ordinary purposes. The venting and filling equipment furnished as standard with the Type "A" galvanized tank is a feature that has developed in our thirty years of experience in building tanks for underground storage.



cised in forming and riveting of the shell and head; third, upon the amount of solder and care in applying it.

Material: All steel plate used in the construction of Wayne Type "A" tanks conforms to the specifications adopted by the Association of Steel Manufacturers for special open-hearth soft tank steel, having an ultimate strength of 45,000 to 55,000 pounds per square inch, an elastic limit of not less than one-half its ultimate strength, capable of being bent cold 180 degrees flat on itself without fracture on outside of bent portion.

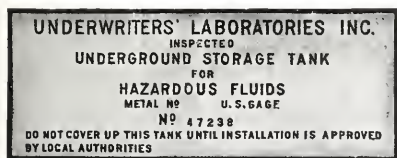
Construction: All rivet holes accurately and evenly spaced and rivets shall be carefully driven, leaving heads neatly finished. All seams shall be full lapped, metal to metal, no foreign substance of any kind being used between joints.

Soldering and Testing: Wayne Storage tanks are solder sweated from inside to out. All seams are heavily coated with the best solder obtainable and after solder flowing the joints each tank is thoroughly tested and given not less than two coats of heavy rust-resisting paint, and all openings carefully plugged before shipment.

These are features that are not employed in the manufacture of the ordinary galvanized storage tank, and it assures the customer that the tank will never cause trouble from leakage.

Great care should be exercised in the manufacture of underground storage tanks. They cannot be examined at stated periods without great trouble and should they leak considerable of their contents may be wasted before it is discovered.

Remember a boiler shop is not necessarily capable of turning out a first-class underground storage tank.

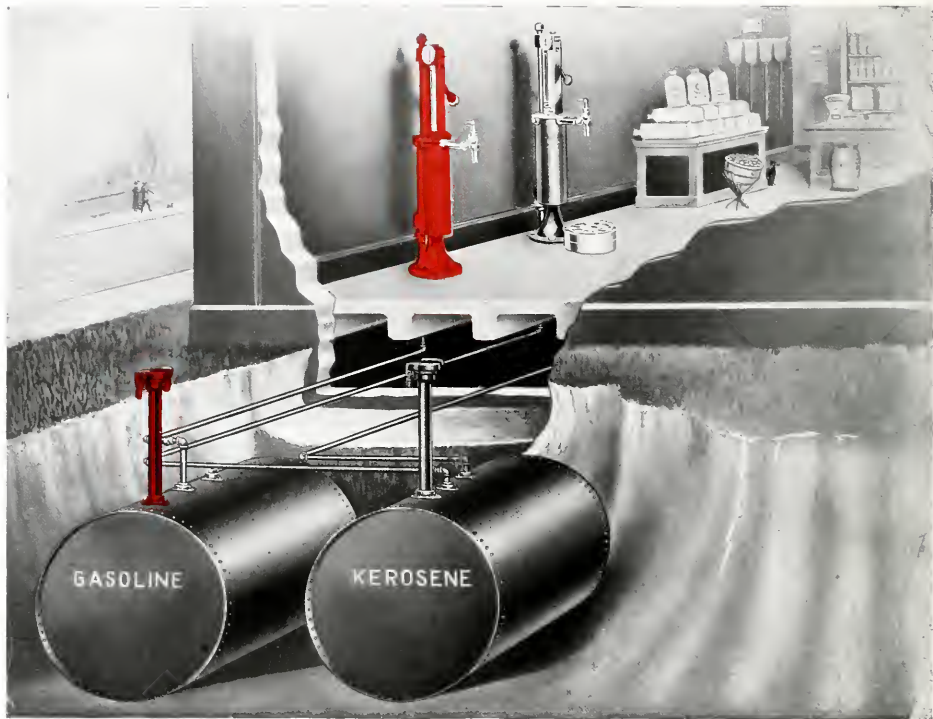


Wayne Standard Galvanized Storage Tanks are built to conform with that measure of safety prescribed by the National Board of Fire Underwriters and are labeled under their supervision when used for volatile liquids such as gasoline and naphtha.

This Underwriters label is an additional assurance to the customer that Wayne tanks bearing it are built of the proper thickness of steel without flaws of any kind, using the proper size rivets, and that the riveting, soldering and construction are properly done.

Our standard fill pipe as shown in cut is equipped with two strainers, an inner fill tube, and vented or air tight fill cap which positively prevents evaporation of the liquid and only admits air to take the place of the liquid that is being pumped out. Should the strainers become clogged, it is only necessary to unscrew the fill cap and take out the entire inner fill pipe, clean the screen and replace it, which can be done in three minutes time.

The service rendered by a storage tank depends, first, upon the grade and thickness of steel plate used in its construction; second, upon the care exer-



A typical installation showing two Type "A" tanks installed underground outside of building (one for kerosene and one for gasoline) connected to two 1 gallon pumps.

This method of storage takes practically no room that could be used for any other purpose, is easy to install, practically fire-proof, will eliminate spillage, waste and the untidy condition prevailing with faucet or "jigger" tank. It will prevent your stock from becoming contaminated with the odor of kerosene or gasoline, and when installed requires no attention; enables you to keep an exact record of daily or monthly sales; enables you to determine the amount of liquid in the tank and positively prevents over and under measurement.

Our experience in this line—extending over a great period of years—is at your service entirely free, without any obligation on your part. We will be able to give you an idea to fit your particular local conditions that will enable you to economically handle the situation.

See the following Bulletins for information on

Black Steel Welded Rectangular Storage Tanks.....	Bulletin 85
Black Steel Welded Cylindrical Storage Tanks.....	Bulletin 86
Black Steel Riveted Cylindrical Crude Oil Storage Tanks	Bulletin 87
Black Steel Riveted Cylindrical Storage Tanks.....	Bulletin 88
Black Steel Riveted Rectangular Storage Tanks.....	Bulletin 89
Gallon Measuring Pump	Bulletin 364
Departmental Oil Storage Equipment.....	Bulletins 35, 38 and 65
Departmental Paint Oil Storage Equipment.....	Bulletins 71 and 82



Equipment for the Storage and Distribution of Lubricating Oils

in Garages, Mills, Factories, Etc.

BULLETIN No. 81



Cut No. 81

THE WAYNE DEPARTMENTAL STORAGE TANK equipped with self-measuring pump will be found almost a necessity where lubricating oil is stored or used. It is practically fire proof and will keep the contents clean and pure.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

General Description

Cut No. 81

The Cut No. 81 Departmental Storage Tank: It is designed for storing lubricating oil in the department where used. It is equipped with self-measuring pump adjustable to different quantities, enabling the operator to determine the amount used in any department or for any purpose.

In factories, mills and garages this equipment provides a very economical way to handle oils, saving the time necessary to go to and from a central oil storage plant. This outfit is not suited for gasoline, nor paint oils.

Pump: The pump used with this equipment is made of heavy cast iron, aluminum, steel, and brass, and discharges a quart at a stroke. The foot valve, stuffing box, etc., are made of solid brass. The measuring cylinder is of heavy spun aluminum. A heavy cast iron cross head holds the discharge pipe in rigid position. Pump is equipped standard with lock.

The pump itself is securely bolted to the tank, but may be easily removed if necessary. Quantity stops are arranged in the head of the pump and are easily adjusted so that the half pints, pints and quarts may be accurately discharged.

The discharge pipe terminates in a non-drip nozzle (Type D) which instantly stops the flow of liquid when pumping ceases.

Valves: As is the case in all Wayne Honest Measure Pumps the foot valve used in this Cut 81 Pump is constructed of brass and is fitted with a strainer. This valve is carefully machined, ground and thoroughly tested. Inasmuch as the valve is the most essential part of a measuring device, this brass ground valve is worthy of special consideration.

Tank: The tank is built of high grade black steel welded. A drip pan is provided in the top of the tank directly under the discharge nozzle.

Finish: The tank is finished standard in dark green enamel attractively lettered in gold. The pump is finished in black enamel with brass and nickel trimmings.

Accessories.

Meter: This pump can be equipped with 100,000 quart meter at extra cost.

Bulletin No. 90.

Tank Sizes and Dimensions.

Capacity	Diameter Inside	Height Inside
1 Barrel— 60 gallons	25"	28"
2 Barrel—120 gallons	32 3/4"	33"



Storage Systems for Paint Oils, Varnishes, Etc.

BULLETIN No. 82



Cut No. 82

Paint oil, varnishes, etc., must be kept free from air in order to maintain them at their highest efficiency. If they are stored in barrels or other containers that permit the gases to evaporate, the oils become congealed and are no longer serviceable. If you open a barrel in which linseed oil is stored you will find an accumulation of "foots and fats," due entirely to evaporation. This is an absolute loss, as there is no way known by which this accumulation can be returned to its original consistency.

The Wayne system illustrated above is absolutely air tight and is guaranteed to handle all of the oils in the paint oil class in a satisfactory manner.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

GENERAL DESCRIPTION

Wayne outfits for paint oils, varnishes, etc., are constructed entirely of metal and designed for handling these liquids in the most approved manner. The system illustrated on the foregoing page is listed by the Underwriters' Laboratories. The pumps are carefully machined and assembled by expert workmen. The tanks are made of the best grade galvanized soft tank steel, spot welded and all seams flushed with solder. They insure clean oil and maintain it at its original consistency.

Pump: The pump illustrated on this outfit will discharge a gallon, half-gallon, quart or pint at a stroke and is known as the 364 long-distance type. It is heavily constructed with valve, valve seats, plunger rod, stuffing box, nozzles, etc., of solid brass. The pump is furnished standard with a discharge register which tallies the number of gallons up to ten, and when specially ordered will be provided with a computer without cost, which will show the charge to make for any fractional part of a gallon. Each pump will be fitted with a standard lever shut-off nozzle. The type of nozzle will depend upon the liquids to be handled. Each pump is provided with a heavy cylinder lock in the handle. The illustration shows the pumps offset and connected to the tanks. This means that the pumps may be set at any point in the building and the tanks at the most convenient place in the cellar or basement.

NOTE: In some instances it is necessary to have a timed pump or brass parts timed. An extra charge is made for this and special attention should be given to the liquids to be handled.

Drip Pan: Each pump is provided with a standard 12" drip pan fitted with screen and cast iron grate. The pipe extending from this drip pan to

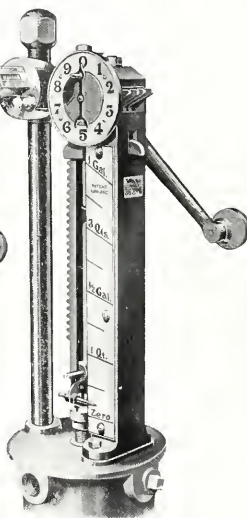
the tank is 1 1/4" galvanized. The tank may be filled through the drip pan if desired.

Manhole: This outfit is furnished with a standard 10"x16" air-tight manhole. This manhole consists of a heavy galvanized iron ring riveted to the top of the tank with cast iron cover. The cover is bolted to this ring by means of hexagon headed cap screws. A reinforced asbestos gasket is used between the faces of the ring and cover. The cover is guaranteed air tight. In the center of the cover

is a 4" opening for fill purposes. This opening is provided with a heavy threaded bar plug. In addition to this the 4" opening is covered with fine screen and a 4" galvanized pipe extends from same to bottom of the tank.

Gauge: This outfit is provided with a metallic dip gauge calibrated in gallons. This gauge operates through a special slotted flange.

Tank: The tanks are made from the best grade open-hearth soft tank steel. All seams are carefully spot welded and flushed with solder. Each tank is supplied with an automatic vent. These tanks are all built the same height and length. They vary in width only to secure the desired capacity. This permits the installation of the tanks in battery form as illustrated. Each tank is distinctly labeled with the name of the oil which it is designed to handle.



Detail of Cut 334 Pump Head. Shows Back Gear for heavy oils, computing scale, discharge register, quantity scale. Lack gearing extra.

Detail of Cut 364 Pump Head. Shows ten gallon discharge register, quantity scale. One hundred thousand gallon meter shown is furnished at extra cost.

Tank Sizes:

	Gal.	H.	W.	L.
2 Barrel	118	30"	24"	40"
3 Barrel	167	30"	34"	40"
4 Barrel	217	30"	44"	40"
5 Barrel	271	30"	55"	40"

The standard equipment includes pump and tank complete with lock and discharge register, Type A nozzle or other suitable nozzle, dip gauge, air-tight manhole, vent, drip pan.

The pump furnished, unless otherwise specified, is the standard long-distance Cut 364.

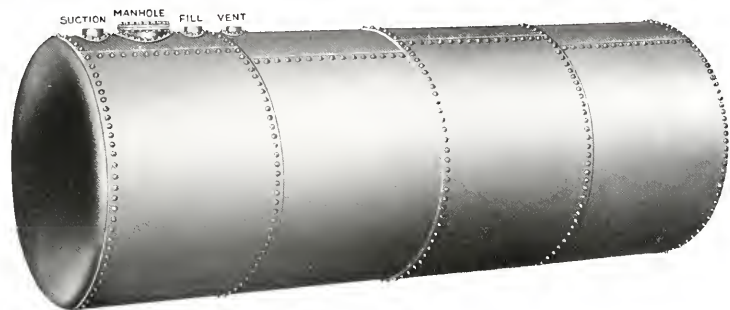


Type A Riveted

Heavy Metal Storage Tanks

(Cylindrical)

BULLETIN No. 88



The manufacture of large capacity heavy metal storage tanks has been a considerable factor in our business during the last twelve years. Realizing that the majority of the tanks we furnish are placed underground, where they are not easily inspected, and that the liquid they contain is valuable, coupled with the further fact that all Wayne tanks are guaranteed two years, we have perhaps been more careful than necessary that each tank bearing the "Wayne" label shall give the purchaser satisfactory service extending over a great many years.

Material: The material used in the construction is of the best Open Hearth Tank Steel obtainable, the plates are free from laminations and surface defects. The plates are of large size to reduce the number of joints and the chances for leakage. The heads are of the best quality of what is called pressing steel. The heads are machine flanged on a flanging machine of the latest design in the heavier type of tanks and on a burring machine by the spinning process in the heavier gauges. The rivets are made by the open hearth process and are of the same specifications as used in the best boiler construction.

The plates are rolled cold by gradual and regular increments to the exact radius required and the whole circumference rolled to a true circle. When butt-straps are used in pressure tanks, these are also rolled to conform to the curvature of the shell.

Construction: All courses of steel are full lapped and riveted metal to metal. No felt, paper, or filler of any kind or rusting compound used. All seams are beveled and carefully caulked by air hammer under pressure. All rivet holes are machine spaced and punched by special gang tool, insuring accurate fit of rivets. Rivets are finished with large button heads.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

DIMENSIONS OF STANDARD WAYNE TYPE A TANKS

Approx. Cap. Gallons	APPROX. INSIDE DIMENSIONS IN INCHES		3-16 SHELL		1/4 SHELL		5-16 SHELL	
	Diameter	Length	Heads	Approx. Wgt.	Heads	Approx. Wgt.	Heads	Approx. Wgt.
250	36"	57"	3/16"	625				
550	42"	92"	3/16"	1000				
1000	54"	101"	3/16"	1395	1/4"	1889		
2000	72"	118"	3/16"	2157	1/4"	2980		
2500	72"	145"	3/16"	2551	1/4"	3531		
3000	72"	175"	3/16"	2955	1/4"	4096		
3500	72"	202"	3/16"	3350	1/4"	4647		
4000	84"	172"	3/16"	3421	1/4"	4749		
5000	84"	213"	3/16"	4082	1/4"	5671		
6000	84"	256"	3/16"	4732	1/4"	6580		
7000	84"	297"	3/16"	5393	1/4"	7502		
8000	108"	202"			1/4"	7224	3/16"	8896
9000	108"	233"			1/4"	7955	3/16"	9794
10000	108"	259"			1/4"	8783	3/16"	10813
12000	114"	277"					3/16"	12173
15000	114"	344"					3/16"	15480
20000	114"	459"					3/16"	18785

This table covers standard dimension tank. Figured from standard mill sheets and standard flanged heads. They are properly proportioned to give the greatest degree of satisfactory service and can all be labeled by the National Board of Fire Underwriters. If dimension must be changed to meet local condition, special prices must be obtained.

Note: Wayne Type A Tanks are built and guaranteed for storage in connection with pumps and gravity systems. They are not suitable to be used for air pressure or hydraulic systems.

Prices for pressure tanks quoted upon inquiry stating maximum working pressure desired.

STANDARD TANKS

Better tanks and more prompt delivery can be made when standard tanks such as shown in the table are ordered.

STANDARD TANK FITTINGS

The following pipe flanges are furnished standard:

Up to and including 550 gallon capacity—3 1/2" suction flange, 2" fill flange, and 1" vent flange;

1000 Gallons up to and including 4000 gallon capacity—3 1/2" suction flange, 3" fill flange, and 1 1/2" vent flange;

5000 Gallons up to and including 20,000 gallon capacity—3 1/2" suction flange, 4" fill flange, and 2" vent flange.

All tanks of 2000 gallons capacity and larger are equipped with a 10"x16" manhole.

SPECIFICATIONS

Specifications covering material and construction are mentioned on the front page of the bulletin. Fittings, etc., are constructed in accordance with the following specifications:

Flanges: On all standard tanks we furnish three extra long boss malleable iron flanges, securely riveted to the shell of the tank and tapped for standard iron pipe thread.

Dip Gauge: The gauge stick is graduated, made of hard wood, and will tell approximately the contents of the tank at any time, the gauging being done through fill-pipe by simply removing the fill-cap.

Manhole: The 10" x 16" cleanout manhole is equipped with machine-faced cover arranged to fasten on manhole frame, with cap screws and asbestos gasket, making the cover air-tight and watertight and, yet, it can be quickly removed for cleaning the tank.

TESTING AND EXAMINATION

Every Wayne storage tank, regardless of size plate used or construction, is rigidly examined and tested by air pressure equal to 25 per cent. more than the pressure exerted on the tank when entirely full of liquid. This safety margin, while not required by specifications, further protects the users of Wayne tanks.

PAINTING

After testing and before shipment, every tank is thoroughly cleaned of all scale and dirt and given two coats of heavy rust resisting paint.

GUARANTEE

All Wayne Tanks are covered by our two year guarantee against any defects in workmanship or material which may become apparent within that time.

Our obligation does not cease when tanks are tested and loaded on cars but covers the service they render the customer after they are properly installed.

LOCATION OF TANK FLANGES AND MANHOLE

You will note by reference to page one that the flanges and manhole are at one end of the tank. This has been found more convenient and simplifies the installation. Should you at any time wish to examine the tank connection, if the tank be placed underground it is only necessary to dig one hole. Our customers sometimes desire to build a box around these pipe connections, in which event this arrangement is found more convenient and less expensive. The position of manhole and flanges can be placed special to suit, if desired.

STANDARD TANK ACCESSORIES

The following fittings and accessories are furnished standard with all tanks:

Fill Pipe: All tanks up to and including 1000 gallons capacity are furnished standard with a 2" or 3" Cut 115 fill pipe with lock and chain.

All tanks of over 1000 gallons capacity may be furnished with a Cut 115—2", 3" or 4" fill pipe with tee connection for filling from tank cars at an additional charge.

Cut 115 fill pipe may be furnished in either the automatic vent or air tight types (specify which in ordering).

Air Vent Protector: When air tight type fill pipe is specified a Cut 108 Air Vent Protector is furnished.

Dip Gauge: Every tank is furnished with a Cut 334 dip gauge for determining the approximate contents of the tank.

ACTUAL THICKNESS OF PLATE

3/16 IN. [REDACTED]

1/4 IN. [REDACTED]

5/16 IN. [REDACTED]

3/8 IN. [REDACTED]

NOTE:—Unless specifically stated on the order, the Company reserves the privilege to ship a riveted, spot welded or oxy-acetylene welded tank.

STEAM COILS

Proper steam coils will be constructed inside of any size of tank at a slight additional cost. Write for prices, stating size of tank and kind of liquid it is to contain.

UNDERWRITERS SPECIFICATIONS AND LABEL

Wayne tanks are constructed in accordance with Underwriters' specifications and bear their label when requested.

The National Board of Fire Underwriters issue standard specifications on tanks. This specification controls the size, the gauge of material and the construction of tanks that are entitled to their inspection and label.

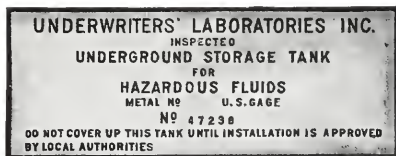
The principal restrictions are as follows:

Dimensions: The diameter of an approved tank shall not be greater than its length nor less than one-fourth its length.

Tank Openings: No tank having flange or opening in either heads, sides or bottom can be labeled. All openings must be made on top of the tank.

Minimum Gauge of Material:

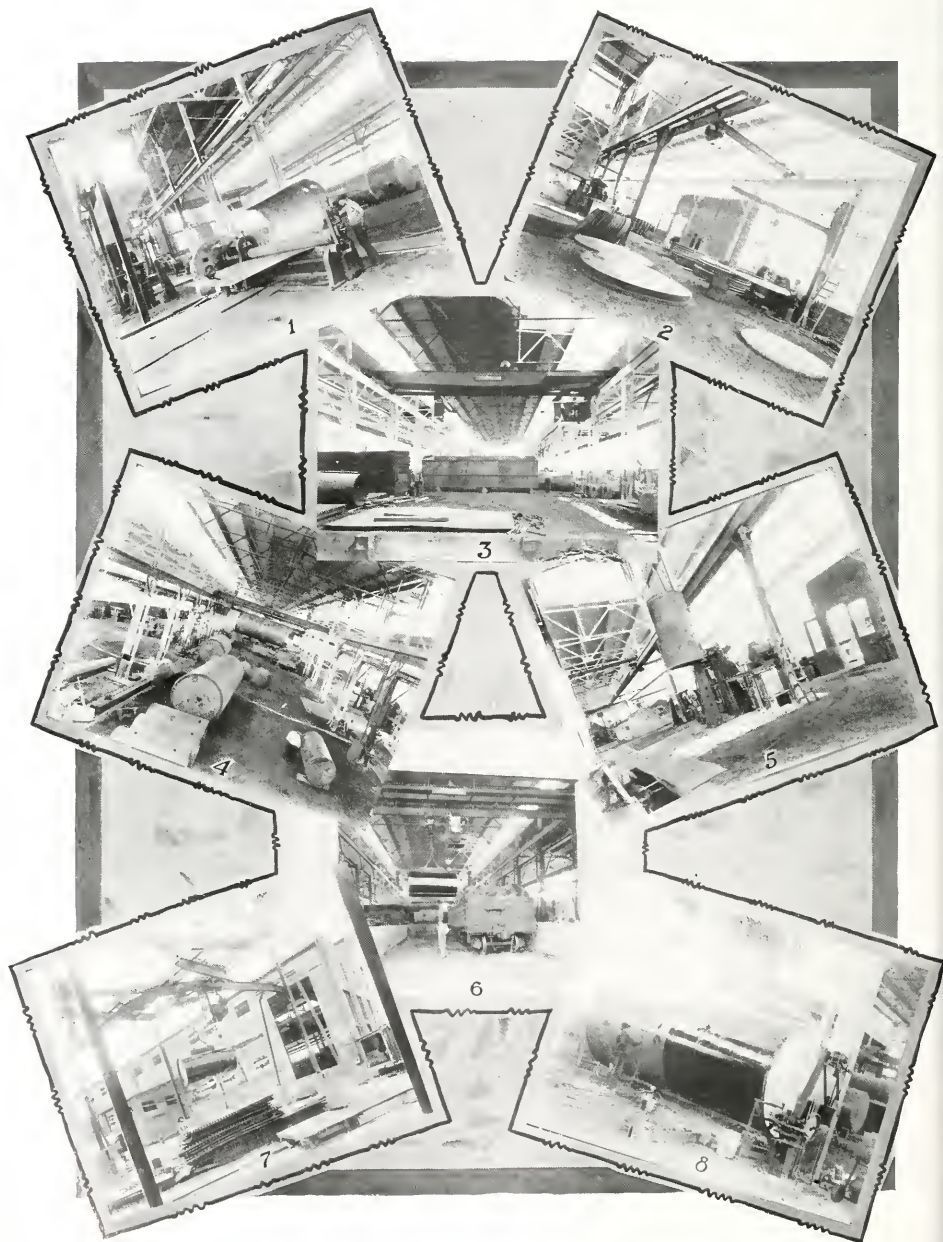
1 to 4000 gals.,	3 16" shell, 3 16" heads
4001 to 10500 gals.,	1 4" shell, 1 4" heads
10501 to 20000 gals.,	5 16" shell, 5 16" heads
20001 to 30000 gals.,	3 8" shell, 3 8" heads



This Underwriters label means individual inspection and test by a representative of the National Board of Fire Underwriters and is an additional assurance that Wayne tanks are built of the right material and are of the most approved construction. Every part of the tank is free from flaws, twists or other defects and is approved by their representative before it is allowed to be labeled.

Wayne Type A tanks, of proper gauge and construction, ON REQUEST will be built under Underwriters' supervision and bear their inspection label.

Tanks not requiring Underwriters' label will be made of gauge of material, dimensions and openings to suit requirements, provided the specifications are consistent with proper construction, as all Wayne tanks are guaranteed two years.



Interior Views of Heavy Metal Tank Shop—Wayne Oil Tank and Pump Company



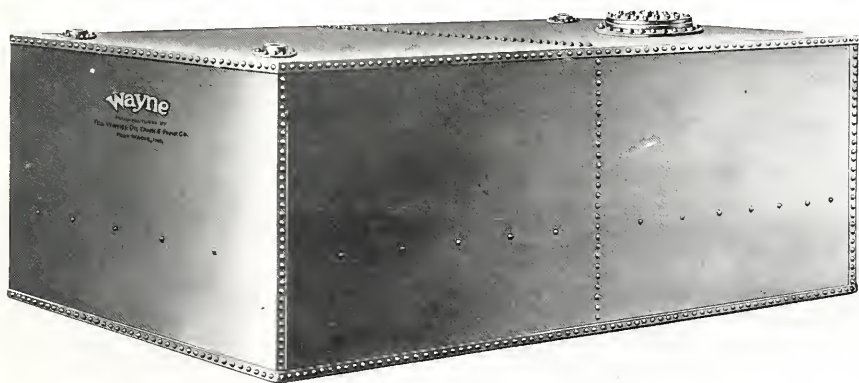
Type S Riveted

Rectangular Heavy Metal Storage Tanks

For the Storage of

Lubricating, Crude and Paint Oils, Light Paint, Cutting Oils,
Kerosene and Other Non-volatile Liquids

BULLETIN No. 89



The methods employed in the construction of heavy metal storage tanks have undergone considerable change in the last few years. This is especially true with the square, or rectangular tanks.

Breaking or bending the corners to exact alignment, shearing and punching so that in assembling the rivet holes come true, allowing the use of rivets of uniform diameter, internal bracing of the larger sized tanks mechanically figured so as to distribute the strain evenly over the entire surface, preventing bulging when the tanks are filled with liquid—is under the direct supervision of a competent engineer.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

The following table on Type S tanks gives several different sizes for each capacity from 500 to 16,000 gallons. The sizes given in black face type are standard, upon which we are usually able to give very prompt shipment and should be used in preference to sizes shown in light face type which require special size plates to construct and may cause delay in shipment.

All sizes given in this table are figured on using stock plates with a minimum of waste. If different sizes are necessary to meet local conditions, special prices must be obtained.

Each Type S tank is fitted with a 10x16 bolted machine-faced manhole with air-tight gasket, 1-2" flange for fill, 1-3 1/2" flange for suction, 1-1" flange for vent, 1-1/2" flange for indicator.

RATED						RATED					
INSIDE DIMENSIONS IN INCHES						INSIDE DIMENSIONS IN INCHES					
Capacity Gallons	Length	Height	Width	Gauge	Approximate Weight	Capacity Gallons	Length	Height	Width	Gauge	Approximate Weight
500	66"	48"	37"	3 16" & 1/4"	1150	5000	134"	90"	96"	1 1/4"	6100
500	66"	54"	33"	3 16" & 1/4"	1180	5000	106"	114"	96"	1 1/4"	6110
500	60"	60"	33"	3 16" & 1/4"	1200	6000	214"	90"	72"	1 1/4"	7270
800	66"	60"	48"	3 16" & 1/4"	1856	6000	170"	114"	72"	1 1/4"	7034
800	64"	54"	54"	3 16" & 1/4"	1824	6000	184"	90"	84"	1 1/4"	7880
800	58"	54"	60"	3 16" & 1/4"	1792	6000	146"	114"	84"	1 1/4"	7140
1000	74"	66"	48"	3 16" & 1/4"	2124	6000	162"	90"	96"	1 1/4"	7060
1000	66"	66"	54"	3 16" & 1/4"	2097	6000	128"	114"	96"	1 1/4"	8891
1000	66"	60"	60"	3 16" & 1/4"	2099	7000	250"	90"	72"	1 1/4"	8260
1100	82"	66"	48"	3 16" & 1/4"	2278	7000	198"	114"	72"	1 1/4"	7975
1100	72"	66"	54"	3 16" & 1/4"	2214	7000	214"	90"	84"	1 1/4"	8230
1100	66"	66"	60"	3 16" & 1/4"	2361	7000	170"	114"	84"	1 1/4"	7940
1200	78"	66"	54"	3 16" & 1/4"	2336	7000	188"	90"	96"	1 1/4"	7920
1200	70"	66"	60"	3 16" & 1/4"	2304	7000	148"	114"	96"	1 1/4"	7690
1200	64"	60"	72"	3 16" & 1/4"	2312	8000	288"	90"	72"	1 1/4"	9900
1500	98"	66"	54"	3 16" & 1/4"	2753	8000	226"	114"	72"	1 1/4"	9450
1500	88"	66"	60"	3 16" & 1/4"	2718	8000	246"	90"	84"	1 1/4"	9300
1500	74"	66"	72"	3 16" & 1/4"	2647	8000	194"	114"	84"	1 1/4"	8920
1800	90"	78"	60"	1 1/4"	3044	8000	214"	90"	96"	1 1/4"	8790
1800	74"	78"	72"	1 1/4"	3086	8000	170"	114"	96"	1 1/4"	8450
1800	64"	78"	84"	1 1/4"	3065	9000	254"	114"	72"	1 1/4"	10473
2000	100"	78"	60"	1 1/4"	3296	9000	276"	90"	84"	1 1/4"	10334
2000	84"	78"	72"	1 1/4"	3241	9000	218"	114"	84"	1 1/4"	9860
2000	72"	78"	84"	1 1/4"	3265	9000	242"	90"	96"	1 1/4"	9865
2500	108"	90"	60"	1 1/4"	3781	9000	190"	114"	96"	1 1/4"	9500
2500	104"	78"	72"	1 1/4"	3690	10000	282"	114"	72"	1 1/4"	12300
2500	88"	78"	84"	1 1/4"	3755	10000	242"	114"	84"	1 1/4"	10760
3000	108"	90"	72"	1 1/4"	4563	10000	268"	90"	96"	1 1/4"	10740
3000	92"	90"	84"	1 1/4"	4241	10000	212"	114"	96"	1 1/4"	10390
3000	82"	90"	96"	1 1/4"	4210	11000	310"	114"	72"	1 1/4"	12140
3500	126"	90"	72"	1 1/4"	4816	11000	266"	114"	84"	1 1/4"	11650
3500	109"	90"	84"	1 1/4"	4680	11000	232"	114"	96"	1 1/4"	12200
3500	94"	90"	96"	1 1/4"	4910	12000	338"	114"	72"	1 1/4"	11840
4000	144"	90"	72"	1 1/4"	5230	12000	290"	114"	84"	1 1/4"	12580
4000	114"	114"	72"	1 1/4"	5140	12000	254"	114"	96"	1 1/4"	11850
4000	124"	90"	84"	1 1/4"	5380	13000	314"	114"	84"	1 1/4"	13400
4000	98"	114"	84"	1 1/4"	5391	13000	276"	114"	96"	1 1/4"	12700
4000	86"	114"	96"	1 1/4"	5260	14000	338"	114"	84"	1 1/4"	14260
5000	180"	90"	72"	1 1/4"	6818	14000	296"	114"	96"	1 1/4"	13500
5000	142"	114"	72"	1 1/4"	6200	15000	318"	114"	96"	1 1/4"	14330
5000	154"	90"	84"	1 1/4"	6350	16000	338"	114"	96"	1 1/4"	15100
5000	122"	114"	84"								

All Riveted Rectangular Black Steel Tanks manufactured by this Company are designated as Type "S".

Material—All steel plate used in the construction of the Type "S" tanks conforms to the specifications adopted by the American Association of Steel Manufacturers for special open-hearth soft steel.

Construction—All courses of steel are full lapped and riveted metal to metal, no felt, paper, filler of any kind or rusting compound used. All seams are beveled and carefully caulked by air hammer. All rivet holes are machine spaced and punched by special gang tool, insuring accuracy.

Testing—All tanks will be tested under pressure and guaranteed to hold safely the liquid for which they are designed.

Sectional view of Type "S" tank showing two **exclusive Wayne features** which have now become common practice.

Upsetting the bottom allows an even bearing on the floor over its entire surface. This method of construction does away with



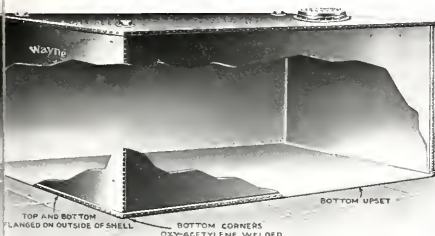
Showing Enlarged Corner on Type "S" Tank

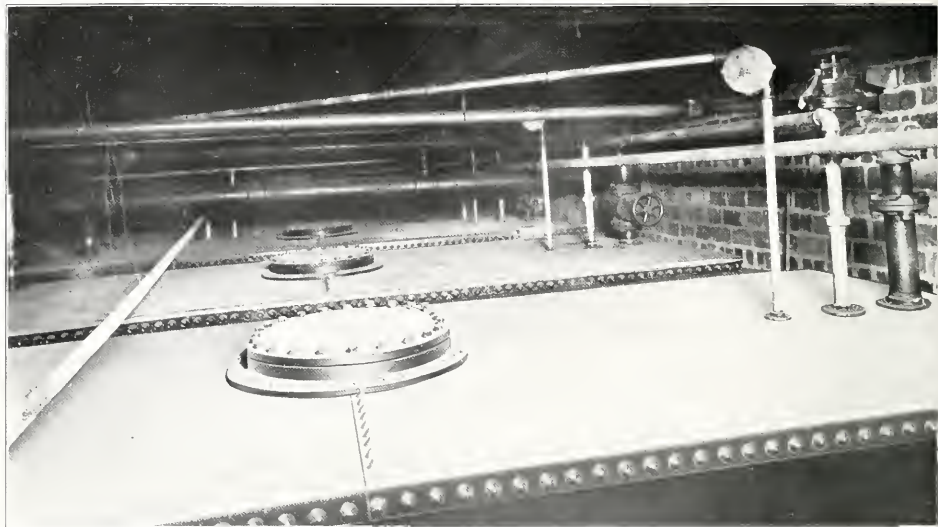
rest plates, the sagging of bottom when tank is full of liquid or when it is necessary to walk on the bottom in cleaning, all of which directly tend to weaken the tank at the seams, causing leakage.

Top and bottom flanged outside of shell not only prevents the shell from bulging, causing leakage where bottom and shell join, but puts all seams on the outside where they can be easily examined and caulked, if necessary, without emptying the tank and breaking pipe connection.

All corners are oxy-acetylene welded, thus strengthening the tank and making a clean, even corner.

This cut shows more clearly the upset bottom, with bevel edge, making caulking a simple operation, if necessary, joining of shell and bottom, showing clearly the construction of this joint, rivets, etc.





Showing group of Type "S" Wayne Tanks installed in the plant of the Hanna Paint Company, Columbus, Ohio, in 1911. The complete equipment furnished and installed by us consisted of 28 tanks, 28 direct-connected electrically driven power pumps, 9 hand pumps, and miscellaneous pipe fittings, etc., requiring 12 cars to handle.

DATA ON TYPE "S" WAYNE TANKS

Dimensions given are inside. Add three inches to length and width and four inches to height for over all dimensions. In ordering Type "S" Tanks to be used in finished building, be careful that smallest opening tank must go through will admit size tank ordered.

Type "S" tanks can be made special shape or of heavier material to suit any local condition and can be arranged with 6-inch clean-out on side near bottom. Steam coils. Agitators, either hand or power. Special openings for pump or draw-off.

Type "S" tanks should be set perfectly level on concrete, brick, stone or wood foundation and there should be at least 16 inches working or head room to properly admit pipe work.

Rectangular tanks should be at least 16 inches apart, to provide room to inspect or caulk should it ever be necessary.

Cylindrical tanks should be used instead of rectangular if they are to be buried underground.

The rectangular tanks should be used in preference to a cylindrical, in basement, vault or oil-house as they will require less room and can be much more easily arranged and installed.

These tanks are not suitable to use in connection with Air or Hydraulic Pressure System.

See Bulletin 88 for data on Cylindrical Tanks.

See Bulletin 330 for data on Tank Indicators.

See Bulletin 268 for data on High-Lift Pump.

See Bulletin 218 for data on High-Lift Counter Balance Pump.

See Bulletin 338 for data on Power Pumps.

See Bulletins 22, 32 and 278 for data on First Floor Pumps.

See Bulletins 24, 27, 35, 37 and 65 for data on small Lubricating Oil Storage Tanks.

See Bulletin 100 for data on Filling Devices.

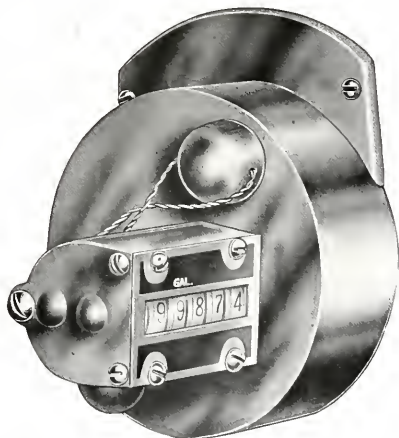


Partial Shipment of Special Tanks for Emergency Fleet.



Gear Driven Compensating Meters

BULLETIN No. 90



A Wayne Gear Driven Compensating Meter

Wayne Meters may be used on any Wayne pump having a capacity of one quart or more. They will record any quantity passing through the pump and keep an accurate record of from 100,000 quarts to 1,000,000 gallons. They are compensating meters and may be adjusted to take care of any changes in the length of the pump stroke.

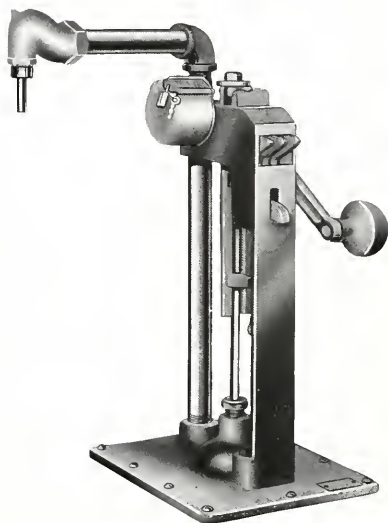
Wayne Oil Tank & Pump Company

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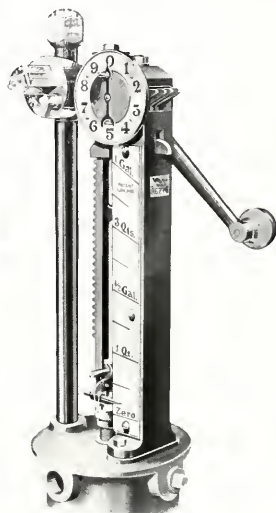
Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

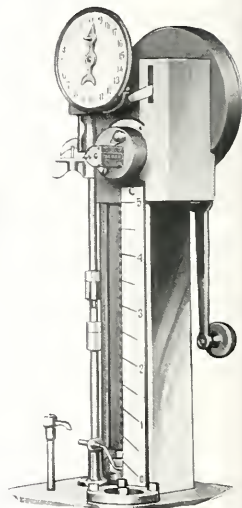
Wayne Gear Driven Compensating Meters



100,000 Quart Meter shows method of installing on quart pumps such as Cuts 35, 65, etc.



100,000 Gallon Meter shows method of installing on gallon pumps such as Cut 364, etc.



1,000,000 Gallon Meter shows method of installing on two and five gallon pumps such as Cuts 302, 275, 276 and 278.

General Description of Wayne Meters

Wayne Gear Driven Compensating Meters are made throughout of white metal and brass. The principle working parts are all die castings, thus insuring absolute accuracy and precision. These meters are attached to the pump heads as shown above. This permits of slight adjustments in the meter in case the pump stroke is changed. Wayne Meters are easily read and keep an accurate check of every drop of liquid passing through the pump. These meters are extra accessories and are charged for as such.

The Quart Meter records up to 100,000 Quarts and then automatically repeats. The Gallon Meter records up to 100,000 Gallons and repeats. The Two and Five Gallon Meter records up to 1,000,000 Gallons and repeats.

All Wayne Meters are gear driven, not friction drive. This feature makes it impossible to obtain the smallest fractional part of a measure of liquid from the pump unless a record of the transaction is shown on the meter. The compensating feature of Wayne Meters is a distinctive Wayne idea and eliminates the slight inaccuracies found in such devices.



Discharge Nozzles and Accessories

FOR

**GASOLINE, NAPHTHA, LUBRICATING AND PAINT OILS,
RUBBER CEMENT, PAINTS, ETC.**

BULLETIN No. 97



THE TYPE "A" Stationary Nozzle with lever shut-off is commonly used on pumps with rigid discharge, such as Cuts 364, 278 and 322. It is of the anti-drip pattern. Made of brass throughout, heavily nickel-plated, strong and liberally proportioned. Furnished in $\frac{3}{4}$ ", 1" and 1 $\frac{1}{4}$ " with standard iron pipe threaded.

Wayne Oil Tank & Pump Company

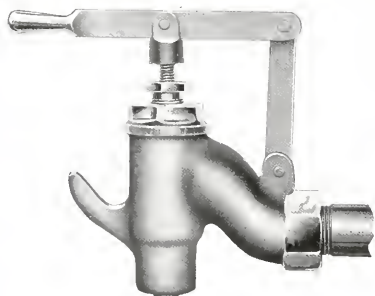
Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

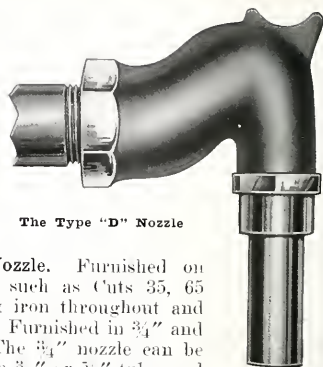
Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

Form 9097 2M Ptd. 6-17-21

The Type "E" Nozzle. Furnished on standard Cut 73. This nozzle was designed principally for use in handling rubber cement, glue, paste or very heavy, stringy oil. Built of brass throughout and heavily nickel-plated. Fitted with standard iron pipe thread, $\frac{3}{4}$ " and 1".



The Type "E" Nozzle



The Type "D" Nozzle

The Type "D" Nozzle. Furnished on standard equipments, such as Cuts 35, 65 and 29. Built of cast iron throughout and heavily nickel-plated. Furnished in $\frac{3}{4}$ " and 1" pipe sizes only. The $\frac{3}{4}$ " nozzle can be furnished with either a $\frac{3}{8}$ " or $\frac{5}{8}$ " tube, and the 1" nozzle can be furnished with either a $\frac{3}{8}$ ", $\frac{5}{8}$ " or 1" tube, these tubes being screwed into the nozzle body.

Hose Tube Type "G." Designed for use on end of hose for insertion into automobile tank or special vessel of any kind. Has extra long tip, preventing splashing or spilling of liquid when filling through curved or special shape fill pipes. Made of brass throughout and heavily nickel-plated. Equipped with fine mesh screen strainer and fitted with standard hose thread, size $\frac{3}{4}$ ", 1" and $1\frac{1}{4}$ ".



Hose Tube Type "G"

Wayne Overhead Drain Valve. Designed for use in connection with hose for filling tank of automobile quickly and correctly and, at the same time, to allow the hose to thoroughly drain after each pumping operation. It will double the life of the gasoline hose. Its mechanism consists of special copper float which closes when the pump is in operation and releases immediately when pumping ceases. Made in $\frac{3}{4}$ ", 1" and $1\frac{1}{4}$ ", and $\frac{3}{4}$ ", 1" and $1\frac{1}{4}$ " iron pipe thread.



Wayne Overhead Drain Valve



Wall Hose Hook, Cut 105

Wall Hose Hooks, Cut 105. These are used for attaching to the wall of a building to provide a place for hanging the hose when not in use. They are made of cast iron, enameled, $\frac{3}{4}$ ", 1" and $1\frac{1}{4}$ " sizes, to fit various sized nozzles. Each hook furnished with necessary wood screws.



Suction Flange Extension

BULLETIN No. 111



Suction Flange
Extension
Cut 111

Cut No. 111 Suction Flange Extension is one of the most modern and practical devices placed on the market in recent years, to facilitate the retail handling of gasoline and other liquids. It affords instant access to foot valves when storage tanks are buried under ground. It requires no digging and no special tools are necessary to remove the suction stub from the tanks as is the case of the ordinary installation.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

Description: The Suction Flange Extension consists of a 3½" tank flange, and an outer pipe casing or sleeve. This sleeve is set into the flange with litharge and glycerine. At the top of the sleeve, and set with litharge and glycerine, is a special coupling. A special connecting ell carries the suction stub and foot valve, which passes through the sleeve. Between the connecting ell and the special coupling, is a gasket of reinforced asbestos. The ell is held rigidly in place by a locking ring.

Material and Workmanship: All parts are galvanized. The foot valve is the regular Wayne type—brass with double valves working independently of each other. All seating surfaces of this entire assembly are carefully machined.

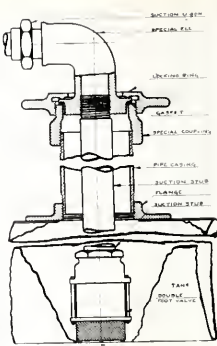
Use: This device can be used to good advantage, where ever a measuring pump is used in connection with an under ground storage tank. This includes garages, filling stations, stores, etc.

Dirty and improperly washed gasoline, dirty truck tanks, and careless delivery of gasoline from trucks to storage tanks, all tend to deposit dirt in the storage tank, which in time is apt to get onto the screens of the foot valves, and hinder their perfect operation.

When installations are made by the old method, this would require digging down to the tank, (in many cases the taking up of concrete or other pavement) in order to get to the foot valve. By the use of the Suction Flange Extension, the foot valve can be taken out without any digging or unnecessary work, whatever. One job of digging will more than pay for several Suction Flange Extensions.

Operation: No special tools are necessary. If it is desired to remove the foot valve, the Suction Union is first loosened by the use of an ordinary wrench. The brass locking ring can usually be loosened with the hand, after which the foot valve can be easily drawn out, cleaned and replaced.

Installation: Figure 2 shows a typical installation of a Suction Flange Extension, suitable at filling stations, or at the curb where the tank is under concrete or other pavement. This is a method now being employed by several large filling station companies and consists of placing the pump on concrete with the tank directly underneath. An open trench is provided, which gives access to all piping.



The open trench has a removable metal cover, which may be locked in place if desired.

Fig. 3 shows an installation, where the tank is not under a pavement. In this case, Fill Box Cut No. 104, should be used.

Care should be used in all cases to see that the suction line slopes slightly from the pump toward the tank and that the line contains no traps.

If it is desired to install a suction flange extension on a tank which has ever contained gasoline or other volatile liquids, it must first be pumped dry, then either filled until it runs over, with water or thoroughly steamed to be sure that no vapor remains in the tank. If this is not done, a serious explosion and loss of life may be the result.

If the old flange is welded on, it may be cut off, the hole enlarged and the new one put on with a portable electric welding outfit. If the old flange is bolted on, the new one can be bolted on by a plumber after the hole has been enlarged. In this case a lead gasket must be used.

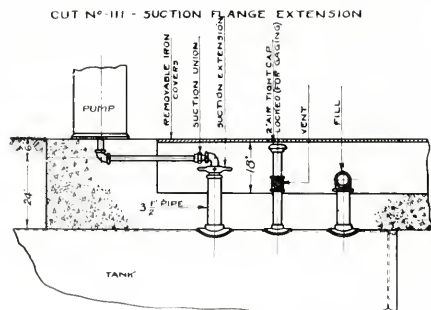


Fig. 2

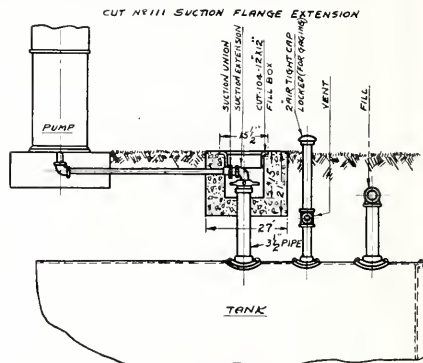


Fig. 3

Data Required: To quote prices intelligently and properly fill orders, the following data must be given:

Diameter of tank with which Suction Flange Extension is to be used.

What is total capacity of tank?

Vertical distance from top of tank to base of pumps.

Vertical distance from top of tank to surface of ground or pavement.

Is 3½-inch tank flange wanted?

If an old tank is to be used state size of present suction flange.

Is foot valve wanted?

What is diameter of suction line?

Wayne

Globes for Gasoline Curb Pumps

BULLETIN No. 101



This shows a reproduction of the standard globe for curb pumps. Unless specifications to the contrary are written on the order, this globe will be furnished. No extra charge will be made for furnishing any of the globes shown in this bulletin.

Wayne Oil Tank & Pump Company

Sales Offices in Principal Cities

Fort Wayne, Indiana, U. S. A.



Santa Fe Trail—

This globe shows a reproduction of the road marker for the Santa Fe Trail, and should be used only on pumps that are used directly on the Santa Fe Trail.

The design and lettering are cut into the globe. The coloring is done with special enamel and then baked, making it permanent.

Lincoln Highway—

The globe opposite shows a reproduction of the road marker used to designate the Lincoln Highway. This globe may be used only on pumps that are situated directly on the Lincoln Highway.

The lettering and design are cut into the glass. The coloring is baked enamel. This sign will neither fade nor chip.





Dixie Highway—

This globe shows a reproduction of the road marker for the Dixie Highway, and should be used only on pumps located on the Dixie Highway.

The lettering and coloring is made by the same process as the other globes shown. It is permanent and always retains its color.

Yellowstone Trail—

This globe shows a reproduction of the Yellowstone Trail road marker. It is to be used on pumps located on the Yellowstone Trail.

The lettering and design are cut into the globe and then enameled. The colors are permanent.

Note.—Where the globes of special design are used, a similar design should be reproduced on the sides of the pump housing. An extra charge is made for this design on the housing. (See foot note on price sheets covering curb pumps.)

The globes shown in this bulletin are only those that will be furnished. Do not specify hand-lettered globes, as they will not be provided.



Wayne

Pumps With Special Road Signs

afford an unusually attractive means of advertising in addition to giving you the latest method of storing and selling gasoline. The illustrations given below show how these pumps can be made to serve this double purpose. While the specially hand-lettered and painted design on the housing is charged for at a nominal extra cost, it more than pays for itself.

These pumps with special road signs should never be used unless the purchaser's place of business is located directly on the highway designated by the sign used.

Special Features. These Wayne pumps are patented, and embody a number of special features that are absolutely necessary to provide the best service. Note carefully the big clock dial register. (See also Bulletins Nos. 280 and 282.) This register counts each gallon pumped, and is in plain view of the customer. It satisfies him that he is getting what he is paying for. The computer shows the fractional parts of gallons pumped, and avoids errors in this respect.

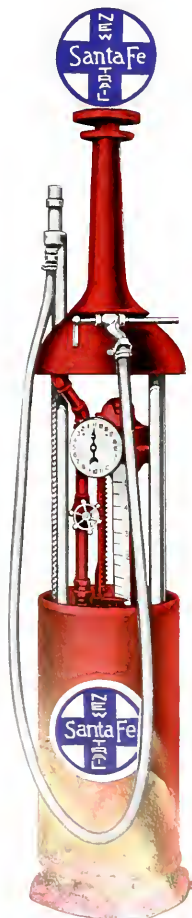
The telescoping housing is a distinct advantage, as it requires no more room when the pump is open than when it is closed. No doors to swing out over the curb line to get broken off.

The meter keeps a continuous record of all gasoline pumped, and affords an accurate accounting to the owner on sales made.

The filter used in connection with this pump is the latest type, and will remove all water and other foreign substances.

Every cast-iron part of this pump that comes in contact with the liquid is galvanized. Every part of the pump, tank and suction line that comes in contact with the liquid is either brass or galvanized metal, making the entire line rust-proof.

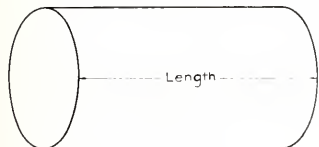
Note carefully all of these special advantages afforded by Wayne equipment, and compare them when you are ready to buy a storage system.



Engineering Tables and Data

BULLETIN No. 150

Cylindrical Tanks



1.

To find the capacity of cylindrical tanks:

$$\text{diameter in ins., squared} \times .7854 \times \text{length in ins.} \div 231$$

the result will be capacity in gallons.

Example: To find the capacity of a cylindrical tank 10 ft. in diameter by 50 ft. long—

diameter in inches, 120—squared equals 14,400

$$14,400 \times .7854 = 11,309.76$$

length in inches, 600

$$11,309.76 \times 600 = 6,785,856.00$$

$$6,785,856 \div 231 = 29,375, \text{ capacity in gallons.}$$

2.

Having the diameter and capacity, to find the required length of a cylindrical tank for the specified capacity:

$$(1) \quad \frac{\text{diameter in inches, squared} \times .7854}{231}$$

result is gallons per inch of length.

$$(2) \quad \frac{\text{capacity}}{\text{Gallons per inch of length}}$$

result is required length.

Example: Required the length of a tank 10 ft. in diameter to contain 29,000 gallons—

(1) diameter in inches 120—squared equals 14,400

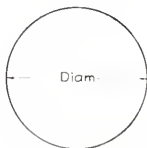
$$14,400 \times .7854 = 11,309.76$$

$$11,309.76 \div 231 = 48.96 \text{—gallons per inch of length.}$$

(2) Capacity 29,000 gallons $\div$ 48.96 = 592 inches

$$592 \text{ in.} \div 12 \text{ (in. per ft.)} = 49 \text{ } 1 \text{ } 3 \text{ feet.}$$

Required length therefore is 49 1/3 feet.

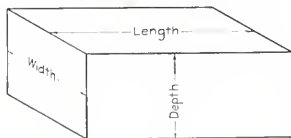


3.

Having the length in inches and gallons capacity, to find the required diameter of a cylindrical tank:

- (1) $\frac{\text{gallons}}{\text{Length in inches}} = \text{gallons per in. of length}$
- (2) $\text{Gallons per inch of length} \div 231 = \text{Area}$
- (3) $1.128 \div \sqrt{\text{area}} = \text{diameter in inches}$

Rectangular Tanks



1.

To find the capacity of rectangular tanks:

$$\text{length in in.} \times \text{width in in.} \times \text{depth in in.}$$

231

the result will be the capacity in gallons.

Example: To find the capacity of a rectangular tank 4' $\times$ 6' $\times$ 8 ft.—

(1) Reduce feet to inches

$$(2) 48 \times 72 \times 96 \text{ inches} = 331,776$$

$$(3) 331,776 \div 231 = 1436$$

Capacity, 1436 gallons.

2.

Having two dimensions and the capacity, to find the third dimension:

$$(1) \quad \frac{\text{first dimension} \times \text{second dimension}}{231}$$

equals gallons per inch of length

$$(2) \quad \frac{\text{capacity in gallons}}{\text{gallons per inch of length}}$$

result is required dimension in inches.

Wayne Oil Tank & Pump Company

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Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems

Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

Example: To find the depth of a rectangular tank to contain 1500 gallons, length being 4 feet and width 6 feet—

- (1) Reduce feet to inches
- (2) $48 \times 72 = 3456$
- (3) $3456 \div 231 = 15$ gallons per inch of length
- (4) $1500 \div 15 = 100$ inches, or $8 \frac{1}{3}$ feet—the required dimension.

This same formula can be used to find either length or width by the same process used to find the depth in the example shown above. Two dimensions and the capacity is all that is required to be known.

Area of Circles

The areas of circles are to each other as the square of their diameters. Doubling the diameter of a pipe or cylinder increases its capacity four times. Friction of liquids in pipes increases as the square of the velocity.

Atmospheric Pressure

Atmospheric pressure at sea level is usually estimated at 14.7 lbs. per square inch, and this pressure will maintain a column of water 33.9 feet high when the normal pressure in the column is relieved by the creation of a vacuum. This is the theoretical distance that water may be drawn by suction. In practice, however, pumps should not be placed over 20 to 25 feet above the water supply, and nearer if possible.

With liquids of lower specific gravity the suction lift is shorter in proportion to the comparison of its specific gravity and its volatility with that of water. Liquids of high volatility like gasoline have a maximum suction lift of 0 to 12 feet, while liquids of low volatility such as lubricating oils can be raised from 16 to 18 feet on the suction lift.

Specific Gravity

Name of Liquid	Spec. Gravity	Height feet, to Provide Pressure of 1 Pound per Square Inch
Light Oils—		
Water	1.000	2.33
Gasoline	.7308	3.08
Kerosene	.8064	2.91
Turpentine (Wood) ..	.8475	2.75
Medium Oils—		
Renown Engine Oil ..	.9036	2.6
Linseed Oil (Boiled) ..	.9062	2.6
Lard Oil	.8792	2.6
Heavy Oils—		
Cylinder Oil	.9237	2.68
Crude Oil (Calif.)	.9482	2.76

Height of Column of Liquid to Equal 1 Lb. Pressure at a Temperature of 74° Fahr.

$$\text{Pressure (P)} = .43 \times \text{Head}$$

$$\text{Head (H)} = 2.3 \times \text{Pressure}$$

Time (T) of emptying a vessel of any area (A) through an orifice of any area (a) anywhere in its side.

$$T = .416 \times \frac{A \times \sqrt{H}}{a}$$

Pressure of Column of Water Per Foot of Height

Every foot of height in a column of water represents .434 lbs. pressure to the square inch. It is

common practice to estimate that every foot in height is equal to one-half pound pressure per square inch, as this allows for ordinary friction in pipes.

Weight of Gallon of Water

A gallon of water weighs 8.33 pounds and contains 231 cubic inches. A cubic foot of water weighs 62.36 pounds, and contains 1,728 cubic inches, or 7.48 gallons.

Miner's Inch

A Miner's inch of water is approximately equal to $11 \frac{1}{2}$ U. S. gallons per minute.

Rules to Determine the Size and Speed of Pulleys or Gears

The Driving pulley is called the Driver, and the Driven pulley the Driven.

If the number of teeth in gears is used instead of diameter in these calculations, number of teeth must be substituted wherever diameter occurs.

To Find the Diameter of the Driver, the diameter of Driven and its revolutions, and also revolutions of Driver being given: Multiply the diameter of Driven by its revolutions, and divide the product by the revolutions of Driver; the quotient will give the diameter of Driver.

To Find the Diameter of the Driven, the revolutions of Driven, also diameter and revolutions of Driver being given: Multiply the diameter of Driver by its revolutions, and divide the product by the revolutions of Driven; the quotient will give the Diameter of the Driven.

To Find the Revolutions of the Driver, the diameter and revolutions of the Driven, also diameter of the Driver being given: Multiply the diameter of Driven by its revolutions, and divide the product by the diameter of Driver; the quotient will give the revolutions of Driver.

To Find the Revolutions of the Driven, the diameter and revolutions of the Driver, also diameter of the Driven being given: Multiply the diameter of Driver by its revolutions, and divide the product by the diameter of Driven; the quotient will give the revolutions of Driven.

Electric Motors

Electric Motors are divided into two general classes:—Direct Current and Alternating Current.

When Direct Current motors are specified it is necessary for us to know at least the VOLTAGE of the current.

For Alternating Current we require the VOLTAGE, PHASE and CYCLE. If prospect cannot give this information it can always be secured from the company furnishing the current.

In order to specify the proper size of motor the head or pressure against which the pump is to operate should be known. When the head or pressure is known reference to the table giving the theoretical horsepower required to raise liquids to different heights will give the theoretical horsepower, and the figure so obtained should be **doubled** to obtain the actual horsepower required.

TABLE OF THEORETICAL HORSE-POWER REQUIRED TO RAISE WATER TO DIFFERENT HEIGHTS.

Feet...	5	10	15	20	25	30	35	40	45	50	60	75	90	100	125	150	175	200	250	300	350	400
Gals. per Min.	.006	.012	.019	.025	.031	.037	.044	.05	.06	.06	.07	.09	.11	.12	.16	.19	.22	.25	.31	.37	.44	.50
5																						
10	.012	.025	.037	.050	.062	.075	.087	.10	.11	.12	.15	.19	.22	.25	.31	.37	.44	.50	.62	.75	.87	1.00
15	.019	.037	.056	.075	.094	.112	.131	.15	.17	.19	.22	.28	.34	.37	.47	.56	.66	.75	.91	1.12	1.31	1.50
20	.025	.050	.075	.100	.125	.150	.175	.20	.22	.25	.30	.37	.45	.50	.62	.75	.87	1.00	1.25	1.50	1.75	2.00
25	.031	.062	.093	.125	.156	.187	.219	.25	.28	.31	.37	.47	.56	.62	.78	.91	1.09	1.25	1.56	1.87	2.19	2.50
30	.037	.075	.112	.150	.187	.225	.262	.30	.34	.37	.45	.56	.67	.75	.94	1.12	1.31	1.50	1.87	2.25	2.62	3.00
35	.043	.087	.131	.175	.219	.262	.306	.35	.39	.44	.52	.66	.79	.87	1.08	1.31	1.53	1.75	2.19	2.62	3.06	3.50
40	.050	.100	.150	.200	.250	.300	.350	.40	.45	.50	.60	.75	.90	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00
45	.056	.112	.168	.225	.281	.337	.394	.45	.51	.55	.67	.84	1.01	1.12	1.41	1.69	1.97	2.25	2.81	3.37	3.94	4.50
50	.062	.125	.187	.250	.312	.375	.437	.50	.56	.62	.75	.91	1.12	1.25	1.56	1.87	2.19	2.50	3.12	3.75	4.37	5.00
60	.075	.150	.225	.300	.375	.450	.525	.60	.67	.75	.90	1.12	1.35	1.50	1.87	2.25	2.62	3.00	3.75	4.50	5.25	6.00
75	.093	.187	.281	.375	.469	.562	.656	.75	.84	.94	1.12	1.40	1.69	1.87	2.34	2.81	3.28	3.75	4.69	5.62	6.56	7.50
90	.112	.225	.337	.450	.562	.675	.787	.90	1.01	1.12	1.35	1.68	2.02	2.25	2.81	3.37	3.94	4.50	5.62	6.75	7.87	9.00
100	.125	.250	.375	.500	.625	.750	.875	1.00	1.12	1.25	1.50	1.87	2.25	2.50	3.12	3.75	4.37	5.00	6.25	7.50	8.75	10.00
125	.156	.312	.469	.625	.781	.937	1.094	1.25	1.41	1.56	1.87	2.34	2.81	3.12	3.91	4.69	5.47	6.25	7.81	9.37	10.94	12.50
150	.187	.375	.562	.750	.937	1.125	1.312	1.50	1.69	1.87	2.25	2.81	3.37	3.75	4.69	5.62	6.56	7.50	9.37	11.25	13.12	15.00
175	.219	.437	.656	.875	1.093	1.312	1.531	1.75	1.97	2.19	2.62	3.28	3.94	4.37	5.47	6.56	7.66	8.75	10.94	13.12	15.31	17.00
200	.250	.500	.750	1.000	1.250	1.500	1.750	2.00	2.25	2.50	3.00	3.75	4.50	5.00	6.25	7.50	8.75	10.00	12.50	15.00	17.50	20.00
250	.312	.625	.937	1.250	1.562	1.875	2.187	2.50	2.81	3.12	3.75	4.94	5.62	6.25	7.81	9.37	10.94	12.50	15.72	18.75	21.87	25.00
300	.375	.750	1.125	1.500	1.875	2.250	2.625	3.00	3.37	3.75	4.50	5.62	6.75	7.50	9.37	11.25	13.12	15.00	18.75	22.50	26.25	30.00
350	.437	.875	1.312	1.750	2.187	2.625	3.062	3.50	3.94	4.37	5.25	6.56	7.87	8.75	10.94	13.12	15.31	17.50	21.87	26.25	30.62	35.00
400	.500	1.000	1.500	2.000	2.500	3.000	3.500	4.00	4.50	5.00	6.00	7.50	9.00	10.00	12.50	15.00	17.50	20.00	25.00	30.00	35.00	40.00
500	.625	1.250	1.875	2.500	3.125	3.750	4.375	5.00	5.62	6.25	7.50	9.37	11.25	12.50	15.62	18.75	21.87	25.00	31.25	37.50	43.75	50.00

TABLE SHOWING HEAD IN FEET AND PRESSURE IN POUNDS.

HEAD OF WATER AND EQUIVALENT PRESSURE						PRESSURE OF WATER AND EQUIVALENT HEAD					
Feet Head	Lbs. Pressure	Feet Head	Lbs. Pressure	Feet Head	Lbs. Pressure	Lbs. Pressure	Feet Head	Lbs. Pressure	Feet Head	Lbs. Pressure	Feet Head
5	2 17	70	30 3	200	86 6	5	11 5	70	161 6	180	415 6
10	4 33	80	34 6	250	108 2	10	23 0	80	184 7	190	438 9
15	6 50	90	39 0	300	129 9	15	34 6	90	207 8	200	461 7
20	8 66	100	43 3	350	151 5	20	46 2	100	230 9	225	519 5
25	10 83	110	47 6	400	173 2	25	57 7	110	253 9	250	577 2
30	12 99	120	52 0	500	216 5	30	69 3	120	277 0	275	643 0
35	15 16	130	56 3	600	259 8	35	80 8	130	300 1	300	692 7
40	17 32	140	60 6	700	303 1	40	92 3	140	323 2	325	750 4
45	19 49	150	65 0	800	346 4	45	103 9	150	346 3	350	808 1
50	21 65	160	69 2	900	389 7	50	115 4	160	369 4	400	922 6
60	26 09	180	78 0	1000	433 0	60	138 5	170	392 5	500	1154 5

Metric System Conversion Table

Millimetres × .03937 = inches.	Litres = 28.316 = cubic feet.
Millimetres ÷ 25.4 = inches.	Hectolitres × 3.531 = cubic feet.
Centimetres × .3937 = inches.	Hectolitres × 2.84 = bushels (2150.42 cubic inches).
Centimetres ÷ 2.54 = inches.	Hectolitres × .131 = cubic yards.
Metres × 39.37 = inches. (Act of Congress.)	Hectolitres ÷ 26.42 = gallons (231. cubic inches).
Metres × 3.281 = feet.	Grammes × 15.432 = grains. (Act of Congress.)
Metres × 1.094 = yards.	Grammes (water) ÷ 29.57 = fluid ounces.
Kilometres × .621 = miles.	Grammes ÷ 981 = dynes.
Kilometres ÷ 1.6093 = miles.	Grammes ÷ 28.35 = ounces avoirdupois.
Kilometres × 3280.8693 = feet.	Grammes per cu. cent. ÷ 27.7 = lbs. per cu. in.
Square Millimetres × .00155 = sq. inches.	Joule × .7373 = foot pounds.
Square Millimetres ÷ 645.1 = sq. inches.	Kilogrammes × 2.2046 = pounds.
Square Centimetres × .155 = sq. inches.	Kilogrammes × 35.3 = ounces avoirdupois.
Square Centimetres ÷ 6.451 = sq. inches.	Kilogrammes ÷ 907.2 = tons (2,000 lbs.).
Square Metres × 10.764 = sq. feet.	Kilogr. per sq. cent. × 14.223 = lbs. per sq. in.
Square Kilometres × 247.1 = acres.	Kilo gram-metres × 7.233 = foot lbs.
Hectare × 2.471 = acres.	Kilogr. per Metre × .672 = lbs. per foot.
Cubic Centimetres × 16.383 = cubic inches.	Kilogr. per Cu. Metre × .062 = lbs. per cu. foot.
Cubic Centimetres ÷ 3.69 = fl. drams. (U. S. P.)	Kilogr. per Cheval × 2.235 = lbs. per H. P.
Cubic Centimetres ÷ 29.57 = fluid oz. (U. S. P.)	Kilo-Watts × 1.34 = Horse Power.
Cubic Metres × 35.315 = cubic feet.	Watts ÷ 746 = Horse Power.
Cubic Metres × 1.308 = cubic yards.	Watts × .7373 = foot pounds per second.
Cubic Metres × 264.2 = gallons (231 cu. in.)	Calorie × 3.968 = B. T. U.
Litres × 61.922 = cubic inches. (Act of Congress.)	Cheval vapeur × .3663 = Horse Power.
Litres × 33.84 = fluid ounces. (U. S. P.)	(Centigrade × 1.8) + 32 = degree Fahrenheit.
Litres × 26.42 = gallons (231. cubic inches).	Franc × .193 = Dollars.
Litres ÷ 3.78 = gallons (231. cubic inches).	Gravity Paris = 980.94 centimetres per sec.

FRICTION OF WATER IN PIPES.

Loss of head in feet due to friction, per 100 feet of smooth, straight cast iron pipe.

Gallons Per Minute	½-Inch Pipe		¾-Inch Pipe		1-Inch Pipe		1¼-Inch Pipe		1½-Inch Pipe		2-Inch Pipe		2½-Inch Pipe		3-Inch Pipe		4-Inch Pipe	
	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.
2	2.10	5.30	1.20	1.40														
3	3.16	11.30	1.80	2.90	1.12	0.90	0.86	0.40		0.187								
4	4.21	19.20	2.41	5.00	1.49	1.52	1.07	0.60	0.79	0.283	0.51	0.09	0.33	0.05	0.45			
5	5.26	29.00	3.01	7.50	1.86	2.32	1.36	0.80	1.07	0.40	0.63	0.157	0.40	0.08	0.68	0.11		
10	10.52	105.00	6.02	27.10	3.72	8.40	2.14	2.18	1.57	1.02	1.02	0.36	0.65	0.12	0.65	0.05		
15			9.02	57.00	6.13	18.90	3.92	1.65	2.72	2.25	1.53	0.81	0.98	0.25	0.68	0.11		
20			12.03	97.00	7.44	30.10	4.29	7.90	3.15	3.70	2.04	1.29	1.31	0.43	0.91	0.18		
25					9.30	45.50	5.36	11.90	4.56	5.60	2.55	1.96	1.63	0.66	1.13	0.38		
30					11.15	64.00	6.43	16.90	4.72	7.80	3.06	2.73	1.96	0.92	1.36	0.38		
35					13.02	85.00	7.51	22.30	5.51	10.30	3.57	3.66	2.29	1.23	1.59	0.51		
40					14.88	109.00	8.58	28.50	6.30	13.30	4.08	4.68	2.62	1.57	1.82	0.65	1.02	0.16
45							9.68	35.20	7.08	16.60	4.60	5.80	2.95	1.97	2.02	0.80	1.17	0.20
50							10.72	43.20	7.87	20.20	5.11	7.10	3.30	2.38	2.27	0.98	1.28	0.24
70							15.01	81.00	11.02	37.60	7.15	13.20	4.60	4.42	3.18	1.83	1.79	0.45
75									11.80	42.70	7.66	14.90	4.93	5.07	3.41	2.11	1.92	0.52
100									15.74	73.00								
120											12.25	36.00	7.84	12.00	5.45	4.97	3.06	1.22
125											12.75	38.90	8.16	13.01	5.68	5.40	3.19	1.33
150											15.30	54.00		9.80	18.72	6.80	7.72	1.82
175													11.43	23.70	7.92	9.75	4.45	2.40
200													13.07	30.90	9.08	12.80	5.11	3.12
225															10.42	16.00	6.32	4.72
250															11.28	19.70	6.40	4.80
270															12.45	22.70	6.90	5.50
275															12.70	23.60	7.03	5.71
300															13.62	27.10	7.66	6.70
350																	8.90	8.80
400																		10.20
450																		11.50
470																		12.16
475																		12.30
500																		12.77

FRICTION OF WATER IN ELBOWS.

Loss of head in feet, due to friction in various sizes of smooth 90° elbows when discharging the given quantities of water

Gals. per Min.	1-Inch		1¼-Inch		1½-Inch		2-Inch		2½-Inch		3-Inch		4-Inch		5-Inch		6-Inch		8-Inch		10-Inch		12-Inch	
	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.	Vel.	Fric.
5	2.04	0.06	1.30	0.14																				
10	4.08	0.22	2.60	0.21																				
15	6.12	0.49	3.90	0.29	2.73	0.09																		
20	8.16	0.87	5.20	0.52	3.64	0.16																		
25	10.20	1.35	6.50	0.80	4.55	0.25	2.60	0.09																
30	12.24	1.95	7.80	1.15	5.46	0.36	3.06	0.13																
35	14.28	2.65	9.10	1.60	6.37	0.50	3.57	0.18	2.29	0.09														
40	16.32	3.46	10.40	2.05	7.28	0.64	4.05	0.23	2.62	0.11														
45		11.70	2.70	8.19	0.81	4.60	0.29	2.95	0.14	2.02	0.06													
50				9.10	0.99	5.11	0.35	3.30	0.18	2.27	0.08													
70				12.74	1.98	7.15	0.70	4.60	0.34	3.18	0.19	1.79	0.05											
100						10.20	1.41	6.54	0.74	4.54	0.29	2.55	0.10											
120						12.25	2.24	7.84	1.17	5.45	0.46	3.06	0.15	1.96	0.06									
150						15.30	3.20	9.80	1.58	6.80	0.66	3.84	0.22	2.45	0.09									
175						11.43	2.16	7.92	0.90	4.45	0.30	2.86	0.12	2.00	0.06									
200						13.07	2.96	9.08	1.18	5.11	0.40	3.27	0.16	2.28	0.07									
250							11.28	1.84	6.40	0.62	4.08	0.25	2.80	0.12	1.60	0.04								
270							12.45	2.35	6.90	0.70	4.42	0.25	3.03	0.14	1.70	0.05								
300							13.62	2.63	7.66	0.89	4.90	0.36	3.40	0.18	1.90	0.06								
350									8.90	1.24	5.72	0.50	3.98	0.24	2.20	0.09								
400									10.20	1.59	6.54	0.63	4.54	0.29	2.60	0.10								
450									11.50	2.01	7.35	0.81	5.12	0.39	2.92	0.13	1.80	0.05						
470									12.16	2.26	7.78	0.90	5.49	0.46	3.07	0.14	1.92	0.06						
500									12.77	2.47	8.17	1.01	5.60	0.48	3.20	0.16	2.00	0.07	1.40	0.04				

When pipe is slightly rough, add 15 per cent. When very rough, add 30 per cent.

Vel.—Velocity in feet per second. Fric.—Friction head in feet.

Table shows loss for one elbow, and is based on Weisbach's Formula for short radius bends.



Kerosene Storage System

For Grocery Stores, General Stores and all other locations
where Kerosene is sold or distributed

BULLETIN No. 164



Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

2M-Ptd. 5-24-21

General Description Cut 164

The Wayne Kerosene System No. 164 puts the retailing of kerosene in the package class.

Every merchant will admit without argument that goods sold in original packages show a greater percentage of profit because this method saves time, eliminates waste, and reduces the selling cost to its lowest point.

This Wayne System makes an original package of each delivery by means of the self-measuring pump, which delivers an exact quantity without sloppage, overflow or waste. It also provides a safe and clean storage place for the commodity and thoroughly protects surrounding products from contamination.

Pump: Pump is constructed of materials that insure strength, durability and accuracy. The pump body or standard is of high grade cast iron. The axles of the operating mechanism are cold rolled steel. The plunger rods are bronze. The measuring cylinder is a seamless brass tube set in heavy cast iron heads firmly held together by four tie-rods. The liquid is drawn into the measuring cylinder through a brass foot valve. All iron parts that come into contact with the liquid are heavily galvanized.

Valves: This is a most important part of any self-measuring pumping system and should be carefully considered by the prospective user before purchasing, as it is on the careful construction and arrangement of the valves that the accuracy of the system depends.

This Wayne Kerosene System is provided with double brass valves. The body is solid brass with poppets and seats carefully machined before assembling. Each poppet is finally ground to a seat as accurately as the valves in an automobile engine, thus insuring proper seating and accurate measure. When completely assembled they are tested under heavy pressure and are proven tight and leakproof before being placed in their proper position in the system.

Discharge Pipe: The discharge pipe is one inch heavily galvanized pipe which terminates in the Wayne Non-Drip Nozzle. The large diameter of this pipe insures easy and quick delivery and the non-drip nozzle prevents the after dripping or dribbling that might occur were an ordinary bib or tap used.

Discharge Register: This indicates the number of gallons delivered up to ten and is operated in connection with the delivery stroke. When the final number (ten) is reached the dial repeats, thus allowing any number of gallons that may be ordered to be automatically counted.

Quantity Stops: This Wayne Kerosene Pump delivers one full gallon. For lesser quantities—

half-gallons, quarts and pints—stops are provided that control the deliveries of these quantities in exact measure.

Computing Scale: This scale operates with the delivery of fluid and indicates without further calculation the amount to charge for fraction quantities, or the amount to deliver for a certain number of "cents' worth" of the fluid. For example: With Kerosene at a certain price per gallon and the customer desiring a fraction of a gallon—five cents' worth—the pointer on the computer indicates when fluid to this amount has been delivered and is an exact quantity or portion according to the gallon price. Note:—A 100,000 gallon recording meter can be attached at extra cost.

Drip Pan: The tank is equipped with a g rated drip pan 14" in diameter. This size will accommodate a standard five gallon container. In case of overflow the liquid returns without waste to the tank. The drip pan is supplied with a lock and key.

Dip Gauge: A dip gauge is provided that indicates the approximate contents of the tank in gallons at all times.

Tank: A rectangular tank of high grade galvanized tank steel is part of the equipment. The seams are closely riveted or spot welded and all seams and angles are flushed with solder, making them absolutely tight.

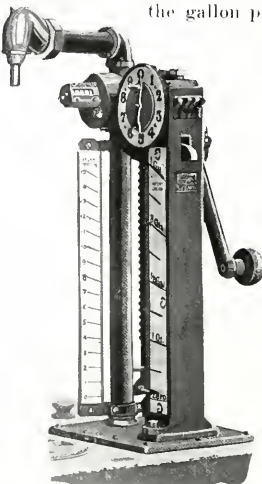
The larger sizes are thoroughly reinforced with angle iron bracings, thus adding strength when strength is needed.

Equipment: The standard equipment includes pump, pump lock, non-drip nozzle, ten gallon discharge register computing scale when desired, tank, drip pan, lock and grate, and drip gauge.

Finish: The steel tank is finished in dark green enamel, but will be finished in any other color, except white, without additional cost. The pump and drip pan are japanned black. The dip gauge stick is painted white and the numbers painted black in large figures. The indicator is enameled black and in connection with the large numbers on gauge stick the amount of fluid in the tank can be distinguished from a considerable distance.

Tank Dimensions: The dimensions listed below are outside measurements.

Cap. Bbls.	Cap. Gals.	Height	Width	Length
1	67	33"	22"	25"
2	129	36"	28"	31"
3	184	36"	28"	44"
4	236	36"	33"	48"
5	289	36"	34"	57"



Showing Meter, Discharge Register, Quantity Scale and Computing Scale. Meter extra.



Condensed Information Furnished in General Letters

General Letters No. 160 to No. 186 Inclusive

SPECIAL NOTE:—All telegrams and correspondence must be addressed to the **COMPANY**. In the body of the letter you may mark it for the attention of some individual, but do not address the individual on the envelope or telegram.

Branch offices in sending in telegrams, should sign all telegrams, except in special instances, Wayne Oil Tank & Pump Co.

General Letter	Date	
No. 160	3-31-19	Changes in prices for timing tanks, Cuts 70 and 82.
No. 161	4-14-19	Bill of Sale order Form No. 583, effective May 1, 1919. This must be filled out and signed by the purchaser in each instance where an old outfit is taken in as part payment on a new order. Duplicate copy to be given to purchaser, original copy to be forwarded with regular order.
No. 162	5- 1-19	No allowances allowed on non-measuring equipment. Reasonable allowance permitted on purchase of new equipment where the purchaser has some measuring equipment to turn in.
No. 163	6-27-19	Obsolete.
No. 164	9- 6-19	Obsolete.
No. 165	9-16-19	Eliminate as far as possible telegraphic orders.
No. 166	9-27-19	War Saving Stamps will not be accepted in payment at anything other than the prevailing sale value.
No. 167	9-27-19	Obsolete.
No. 168	11- 8-19	Obsolete.
No. 169	11-10-19	All communications, letters, telegrams, etc., must be addressed to the COMPANY and not to individuals.
No. 170	11-11-19	Except in extreme cases all orders for special equipment will be refused.
No. 171	11-28-19	Effective December 1, 1919, no cash discount granted to any purchaser where any quality or special discount of any character is given.
No. 172	12- 3-19	Obsolete.
No. 173	12- 5-19	Definite shipping dates on April orders should be avoided wherever possible. All orders should read "Shipped on or before April 1, 1920," not "On April 1, 1920."
No. 174	12-15-19	All orders should read "Shipment as soon as possible," this avoids a misunderstanding and likelihood of cancellations.
No. 175	12-30-19	All dry cleaning prices discontinued over a year ago. Quotations furnished on dry cleaning equipment in none other than extreme cases.
No. 176	1- 7-20	Misprint in the Quantity Purchase Agreement. Corrected form supplied.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

No. 177	1-13-20	Cuts Nos. 22 and 32 discontinued. Cut No. 364 replaces both models. Cut No. 364, \$80.00, "A" rate f. o. b. Fort Wayne, Indiana. San Francisco and Albany prices carry same advance charge as previously made on Cut No. 22 Model II. First floor type of new Cut No. 364, \$70.00, f. o. b. Fort Wayne, Indiana. San Francisco and Albany add same charge as made on old first floor type, Model II pump.
No. 178	1-26-20	Obsolete.
No. 179	1-31-20	Effective February 10, 1920, regular rate of commission will be based on all sales on which terms do not exceed eight months and the rate of commission will be 5% less than that specified in the contract where payments do exceed eight months.
No. 180	2- 2-20	General information regarding shipping situation. Such information is now obsolete as conditions have been changed.
No. 181	2- 7-20	Obsolete.
No. 182	2-10-20	All prices on 16 Guage tanks discontinued. These tanks removed from line.
No. 183	2-10-20	Cut No. 216 portable discontinued. Replaced by Cut No. 228 portable. Cut No. 228 is equipped with new No. 364—1-gallon pump.
No. 184	2-18-20	Price sheet dated February 20, on Cuts Nos. 35 and 65 incorrect. Foot note should read "Add \$20.00 to above where one-half gallon pump is desired and add \$40.00 where one gallon pump is desired."
No. 185	3- 2-20	Previous arrangements regarding Liberty Bonds accepted on accounts is hereby terminated.
No. 186	3- 4-20	Effective March 15, covering prices for tinning tanks. On standard rectangular tanks of not more than one thousand gallons capacity add \$27.50 net for the first barrel and \$12.00 net for each additional barrel thereafter. Write Home Office for prices covering the tinning of rectangular tanks larger than one thousand gallons.



Condensed Information Furnished in General Letters

General Letters No. 187 to No. 210 Inclusive

SPECIAL NOTE:—All telegrams and correspondence must be addressed to the **COMPANY**. In the body of the letter you may mark it for the attention of some individual, but do not address the individual on the envelope or telegram.

Branch offices in sending in telegrams, should sign all telegrams, except in special instances, Wayne Oil Tank & Pump Co.

General Letter	Date	
No. 187	3-10-20	All parcel post shipments given numbers in Duplicate. When supplies are received by Salesmen or Branch Manager, it is important that they sign card and return same at once.
No. 188	3-16-20	Model F Cuts 41 and 43 half gallon pumps were discontinued January 1st. We have not yet placed in production the half gallon size of pump similar to the Cut No. 360. Necessary to withdraw temporarily Cuts 45 and 80. Sales force will be advised as soon as this equipment is again placed on market.
No. 189	3-16-20	All acceptable business received during calendar year of 1920 will be counted in Wayne Winner Club Contest. Salesmen must be in the employ of the Wayne Oil Tank and Pump Company at the expiration of contract year.
No. 190	4-6-20	Prices for white enameling.
No. 191	4-15-20	Complete New Price Books being issued. May 1, 1920, is last day for protection of old prices.
No. 192	4-16-20	We can ship following from stock: Cuts 11, 205 and 207. Following can be shipped on or after May 15th: 278, 280, 282, 302 and 320. No shipments on following until after July 1st: 27, 35, 65, 81, 164, 276, 227, 228.
No. 193	4-25-20	Correction in price of timing tanks up to 1000 gallon capacity.
No. 194	5-28-20	Advice to salesmen relative to passing credits under normal conditions, which makes it necessary for Company to hold up doubtful orders. Salesmen should use caution in taking orders.
No. 195	6-28-20	Letter to salesmen regarding ability of Wayne Standard Equipment to handle so-called blended gasoline. All orders must specify grade of gasoline to be handled.
No. 196	7-6-20	Can make shipment on standard heavy metal tanks within 30 days to six weeks from receipt of order.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

General Letter	Date	
No. 197	7- 6-20	Regular cash discounts are entitled to purchaser who get special discount on quantity purchase contract.
No. 198	7-12-20	New price on easter frame for Cut 81, effective July 15th. Price \$5.00 net.
No. 199	8- 3-20	Railroads have established minimum weight of 4000 pounds for transportation on tanks from one thousand gallon to three thousand gallon. This is due to bulk of tanks and customer will be required to pay freight on 4000 pounds.
No. 200	8- 5-20	Salesmen are permitted to sell wholesale oil companies, by tolerance. One-half total commission to be credited on a sale of this character at the time the order is approved. Remaining one-half will be credited to the salesman at the time the serial numbers are reported to the Home Office.
No. 201	9- 2-20	New prices on fill boxes effective September 10th, 1920: Cuts 101 and 106, \$6.00; Cut 104, \$11.00; Cut 103, \$8.50, A rate.
No. 202	9-17-20	Gargyle emblem will be attached to the front or street side of each of the tanks in the battery composing Cut 200 and one emblem will be attached to each end. No emblem will be attached to the building side, or back of the equipment.
No. 203	9-29-20	Be sure to make careful note when order is taken, with terms calling for payment against sight draft, that the stations to which shipment goes is a regular agency station.
No. 204	10-11-20	We cannot accept any second-hand equipment which has been taken in by the salesmen. This equipment is the property of the salesman and it in turn must be disposed of by the salesman.
No. 205	11- 4-20	Additional prices on Cuts 35 and 65. Each of these outfits sell for \$40.00 instead of \$32.00, as shown in the price list. The half gallon pump is off the market.
No. 206	11- 6-20	We cannot and will not guarantee to replace hose until cause for the defect has been determined upon. If the manufacturer sees fit to replace the hose he will give customer new hose for old.
No. 207	11-12-20	We can make immediate shipment on the following: 11-62-205-275-280-282-302-303-227 Portable; Cut 81—1 barrel; Cut 200—3 compartment, 20 gallon; Cut 200—3 compartment, 30 gallon; Cut 200—4 compartment, 20 gallon; Cut 200—4 compartment, 30 gallon. We can make prompt shipment on all heavy metal tanks.
No. 208	11-12-20	We have enough stock on hand to build 30 to 35 Cut 80 Kerosene Outfits, 2 barrel capacity only. Special price of \$90.00, A rate.
No. 209	11-17-20	We can make immediate shipment on practically the entire line, with the exception of the lubricating and paint oil equipment. We can furnish any size tank immediately on all of the underground equipment with the exception of two barrel, 14 gauge.
No. 210	11-27-20	Salesmen are permitted to take orders and write on the face of such orders that the purchaser may, at his option, carry the January and February payments over until the following months. These payments will be due in May.

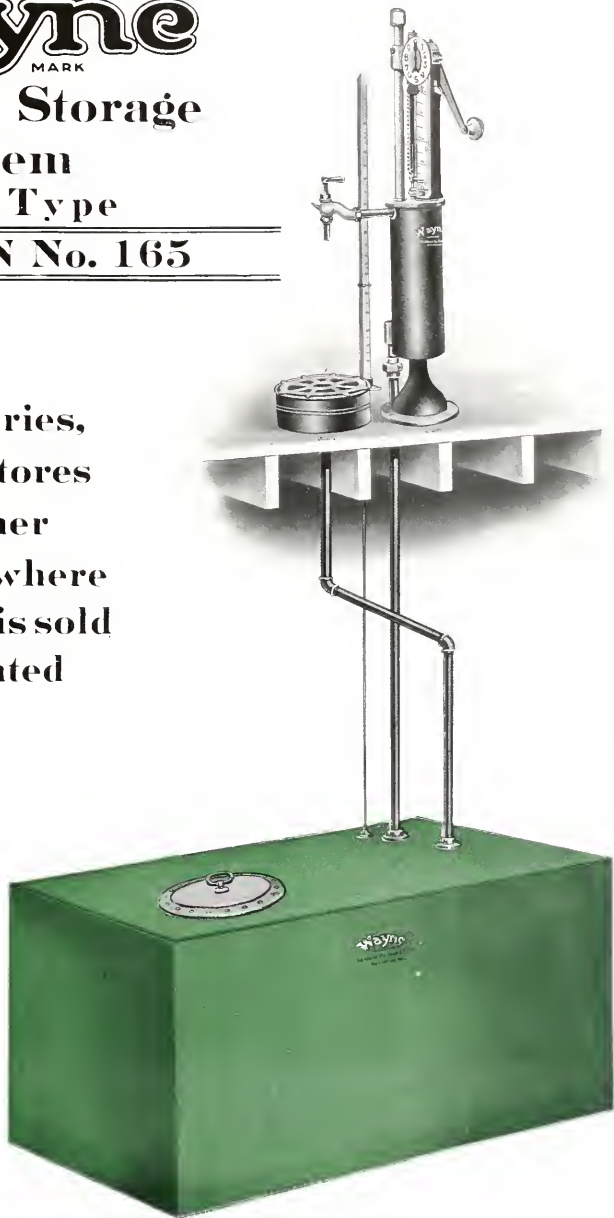
General Letter No. 197. Discounts on Quantity Purchase Agreements are confined to the discounts specifically mentioned in the agreement. Discounts on classifications are also confined to the specific discounts granted to such classification. On single purchase orders specifying enough equipment to qualify for a quantity discount, terms may be granted. Where terms are permissible the cash discount can also be taken advantage of by the customer. The thing to do is to distinguish between quantity purchase agreement discounts and merely quantity discounts.

REG. U. S.
Wayne
TRADE MARK

**Kerosene Storage
System
Cellar Type**

BULLETIN No. 165

**For Groceries,
General Stores
and all other
locations where
Kerosene is sold
or distributed**



Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

This Wayne System also provides a safe and clean storage place for the commodity and thoroughly protects surrounding products from contamination.

Pump: Pump is the Wayne long distance type, a type that is specially built to draw liquid from floor to floor and is the same type of pump as is used in Wayne System No. 364 with Computer Scale.

The pump body or standard is of high grade cast iron. The axles of the operating mechanism are cold rolled steel. The plunger rods are bronze. The measuring cylinder is a seamless brass tube set in heavy cast iron heads firmly held together by four tie rods. The liquid is drawn into the measuring cylinder through a solid brass foot valve. All iron parts that come into contact with the liquid are heavily galvanized. Standard equipment includes lock for pump.

Valves: This is a most important part of any self-measuring pumping system and should be carefully considered by the prospective user before purchasing, as it is on the careful construction and arrangement of the valves that the accuracy of the system depends.

This Wayne Kerosene System is provided with double brass valves. The heavy body is solid brass with poppets and seats carefully machined before assembling. Each poppet is finally ground to a seat by hand as accurately as the valve in an automobile engine, thus insuring proper seating and accurate measure. When completely assembled they are tested under heavy pressure and are proven tight and leakproof before being placed in their proper position in the system.

Discharge Pipe: The discharge pipe is one inch heavily galvanized pipe which terminates in the Wayne Non-Drip Nozzle. The large diameter of this pipe insures easy and quick delivery and the non-drip nozzle prevents the after dripping or dribbling.

Discharge Register: This indicates the number of gallons delivered up to ten and is operated in connection with the delivery stroke. When the final number (ten) is reached the dial repeats, thus allowing any number of gallons that may be ordered to be automatically counted.

Quantity Stops: This Wayne Kerosene Pump delivers one full gallon. For lesser quantities—half-gallons, quarts and pints—stops are provided that control the deliveries of these quantities in exact measure.

Computing Scale: This scale operates with the delivery of fluid and indicates without further calculation the amount to charge for fraction quantities, or the amount to deliver for a certain number of

"cents" worth" of the fluid. For example: With Kerosene at a certain price per gallon and the customer desiring a fraction of a gallon—five cents' worth—the pointer on the computer indicates when fluid to this amount has been delivered and is an exact quantity or portion according to the gallon price.

Note:—A 100,000 gallon recording meter can be attached in place of the computing dial at an additional price. Whenever meter is desired it is necessary to take off the computer dial and make certain changes in the pump head. These changes cannot be made after the system leaves the factory.

Drip Pan: A drip pan is provided which is placed on the floor under the delivery nozzle, and is connected directly by a pipe to the storage tank so that drip or overflow that may be caused by a misjudgment of the capacity of the receiving container is returned to the tank. This drip pan is strong and well made and includes a meshed screen that prevents the entrance of dust and dirt.

Float Gauge: A float gauge and float is provided that indicates the approximate contents of the tank in gallons at all times. It also serves as a warning signal when the contents are getting low.

Tank: A rectangular tank of high grade galvanized tank steel is part of the equipment. The seams are closely riveted and all seams and angles are flushed with solder, making them absolutely tight. The larger sizes are thoroughly reinforced with angle iron braciings, thus adding strength when strength is needed.

Tank is provided with manhole that the contents of original packages may be quickly drained into it. An accurately fitting, dust and dirt tight cover is provided for it, and this cover is securely locked that the contents may not be removed in any other way except through the pump. Tank can be filled either from the first floor or the basement.

Equipment: The standard equipment includes pump, non-drip nozzle, 10 gallon discharge register, computer, tank, drip pan and grate, and float gauge.

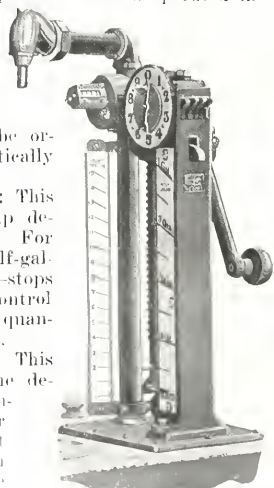
We Must Know: When placing order it is necessary that we be advised of the distance from the basement where tank is to be placed to the floor level where the pump will stand that connecting pipe of the proper length may be supplied. No pipe will be furnished without this information.

Straight Pipe only will be furnished without offsets or horizontal lengths.

Finish: The steel tank is finished in dark green enamel, but will be finished in any other color, except white, without additional cost. The pump and drip pan are enameled black. The float gauge stick is painted white and the numbers painted black in large figures. The indicator is enameled black and in connection with the large numbers on gauge stick the amount of fluid in the tank can be distinguished from a considerable distance.

Tank Dimensions: The dimensions listed below are outside measurements.

Cap. Bbls.	Cap. Gals.	Width	Length	Height
1	67	22"	25"	36"
2	129	28"	31"	36"
3	184	28"	44"	36"
4	236	33"	48"	36"
5	289	34"	57"	36"



Showing Meter, Discharge Register, Quantity Scale and Computing Scale. Meter extra.

REG. U. S.
Wayne
TRADE MARK

Sidewalk Pump for Gasoline

BULLETIN No. 205



Cut No. 205 Closed

Cut No. 205 Open

This is an inexpensive outfit that will materially aid in increasing your business. It may be used in connection with any place of business which handles or sells gasoline or kerosene. It is one of the latest designs on the market and embodies the most modern features required in a device of this kind.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

GENERAL DESCRIPTION

This pump is of the long distance type. The storage tank is buried underground in any convenient location and at any reasonable distance from the pump. The pump and tank are connected by a 1½" pipe line, allowing free and rapid flow of gasoline. This pump is especially designed for sidewalk installation but may be used inside if desired. A cabinet or housing, made of cast iron, thoroughly protects the working parts from the elements. The door, on the street side, in which is set the large 20 gallon discharge register, is stationary. The door on the opposite side may be opened and closed, giving access to the operating parts of the pump. This overcomes the objection found in pumps of this kind where the door on the street side swings out over the curb line, making it liable to be broken off. The door is locked by means of a special tumbler cylinder lock. The pump is provided with the overhead discharge and hose draining valve. Discharges gallons.

Valves: The suction line is 1½" in diameter and is provided with a set of double brass valves, upon which the accuracy of any measuring pump primarily depends. Before purchasing, this point should be thoroughly investigated. Too much stress cannot be laid upon their construction and arrangement. In the Wayne system these valves are made entirely of brass. The poppet and seat are carefully machined and then hand ground. The body in which these valves are set is solid brass. Each valve works independently of the other. After this care in construction all the valves are tested under heavy pressure to eliminate any possibility of leaks.

Discharge: This pump is provided with the overhead discharge only. This discharge terminates in the hose draining valve, which permits the hose to drain each time the pump is operated. The pump is provided with eight feet of standard 1" hose, terminating in a curved bib nozzle. This pump will not be provided with the swivel discharge. The overhead discharge is furnished with a shut-off cock inside the housing, which permits shutting off the overhead discharge so the filter may be drained.

Space Required: This pump has a base diameter of 14 inches. The size of the housing is, width 13½ inches, depth 12 inches. The base requires 154 square inches. Height with lamp post and globe 89 inches. Height without lamp post 49 inches.

Discharge Register: The stationary door on the street side of the pump is fitted with a 20-gallon discharge register similar to that used on Cuts 276, 278, 280 and 282. This register counts the number of gallons pumped up to twenty and shows the purchaser exactly how much gasoline or kerosene is being delivered, which is one of the features that has made the other Wayne pumps so universally adopted.

Filter: This pump is fitted with the Wayne special filter which is guaranteed to separate water and other impurities from the gasoline or kerosene. It is constructed similarly to the filter used on the other curb gasoline or kerosene pumps. A filter draw-off is provided in the housing which will permit the operator to pump the water and other impurities out of the pump whenever necessary.

Quantity Scale: The outfit is provided with a quantity scale which shows any fractional part of a gallon discharged.

Meter: This pump is also provided with a standard 100,000 gallon meter, similar to that used on the Cut 278 and 276. This meter has a positive drive from the cog rack and is gear operated. It has the special compensating features embodied in the meter as on other Wayne pumps and will accurately record every fluid ounce of gasoline or kerosene discharged.

Finish: Standard finish is orange enamel, but may be finished in any other color except white enamel without charge. If special road signs or other designs are wanted, an extra charge will be made for this work.

Tank Dimensions: Standard tanks are made in the following sizes:

Capacity Bbbs.	Capacity Gallons	Diameter Inches	Length Inches	Capacity Bbbs.	Capacity Gallons	Diameter Inches	Length Inches
1	63	27	30	9	500	38	107
2	120	31	42	10	550	38	118
5	280	38	61				

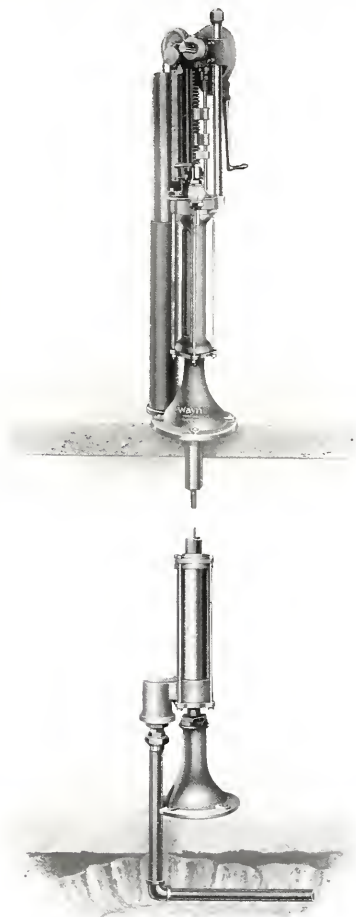
The standard fill pipe is 30" high from top of tank. If requested 42" or 48" fill pipe will be furnished. To find the depth of the excavation necessary to bury the tank, add diameter of tank to length of fill pipe, allowing about six inches of the fill pipe to extend above ground.

Equipment: The standard equipment includes the following: Pump, overhead discharge complete, 8 feet of hose, curved bib, computer, discharge register, filter, meter, tank, gauge stick for tank, fill pipe complete, foot valves, suction pipe for tank with union; (pipe from union to tank not included) also electric light post complete, including globe, lettered "Filtered Gasoline."

REG. U. S.
Wayne
TRADE MARK

High Lift Heavy Duty Counter- balanced Gasoline or Oil Pump

BULLETIN No. 218



Cut 218—Pump

High lift heavy duty counterbalanced gallon pump for handling gasoline and oil where the vertical lift is more than fifty-five feet.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

USES AND ADVANTAGES

The Cut 218 heavy duty counterbalanced gallon pump is designed to lift gasoline, light or heavy bodied oils where the vertical lift is over 55 feet. If the lift is under 55 ft., use our Cut 268 or if under 14 ft. use our Cut 22 or 32 pump.

In **factories, mills and garages** this equipment will be found the most economical way to deliver liquids from storage tanks located in basements and above or below ground tanks adjacent to building, saving time necessary to go to and from a central oil storage tank.

Almost every factory presents varying condition. One rule, however, will serve to guide all installations of the Cut 218 pump, and where this is correctly established the flexibility of the equipment will allow it to be successfully installed to meet almost any condition.

Theory and Practice have demonstrated that the suction cylinder of a pump intended for handling gasoline cannot be placed more than 12 feet vertically above the bottom of the tank it draws liquid from. For Lubricating and heavy body oils, 16 to 18 feet. In the high lift pump, such as Cut 218, this is accomplished by using a detached cylinder, which is connected to the pump by means of a plunger rod and riser pipe as shown on first page.

The vertical distance between drop cylinder and bottom of tank cannot be more than 12 feet for gasoline, and 18 feet for oil, but the horizontal distance between tank and cylinder may be any reasonable distance, many pumps being in successful operation up to 300 feet. The drop cylinder can be set on basement, first floor, or if necessary to come within the vertical maximum limit can be set in a pit underneath the floor; but the cylinder must always be in a direct plumb line underneath the pump, on account of the suction rod that runs up through the riser pipe. (See typical installation, page No. 4.)

Connecting more than one pump to the same tank is perfectly feasible, but this must be done by running a separate suction line from each pump to the tank and each suction line must be fitted with a foot valve. It is therefore necessary to have a separate flange in the tank for each pump.

Where we furnish the pump only, the tank being already installed or bought elsewhere, it should have a 3" flange to admit our standard 1½" foot valve. If this is impractical, it will be necessary to use a vertical line valve, which is furnished in place of the standard foot valve when specified, without additional charge.

STANDARD EQUIPMENT ON CUT 218 PUMP

Pump Head: The pump head, or pump proper, is made of heavy cast iron and steel. The suction rod running from the pump to the drop cylinder (usually located on the first floor) is connected by means of couplings and jam nuts. The pump, being equipped with expansion chamber, provides room for the expansion of the liquid in the cylinder due to the changes in temperature which insures correct measurement of **pints, quarts, half-gallons and gallons.**

Discharge Register: Automatically tallies the number of gallons pumped up to ten and then repeats. Avoids mistakes in filling large vessels and provides a check should operator be called away before finishing his work.

Counterbalance Weight to equalize the combined weight of the Suction Rod and liquid in the riser pipe necessary to reduce the power required to operate the pump.

Quantity Scale with pointer, to draw intermediate quantities and fill odd size containers.

Pump Locks: A tumbler lock is built in the head of the pump, provided with two keys, and only those in possession of keys can operate the pump.

Quantity Stops: An accurate **pint, quart, half-gallon or gallon** can be pumped at the will of the operator, by simply moving the quantity lever to the required amount.

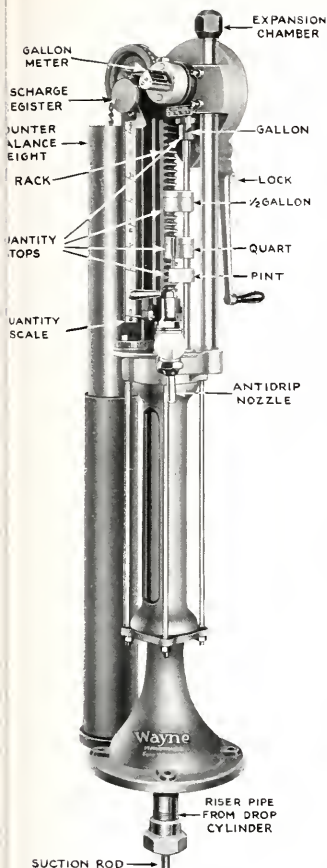
Anti-Drip Nozzle Type A With Lever Shutoff is provided with this pump. It instantly stops the flow of liquid when pumping ceases.

Foot Valves: As standard equipment with this pump, a 1½" Wayne double brass foot valve is furnished, having carefully ground seats effectually holding the liquid in the suction line, keeping it full at all times, assuring correct measurement of the pump.

Riser Pipe: 55 feet of galvanized pipe, plunger rod and jam nut are furnished standard with each pump. This riser pipe is two inch in size for any liquid and extends from pump to drop cylinder. Each additional foot extra.

Joint Compound: A can of litharge and glycerine—(insoluble in gasoline or oil) to use in making joints of pipe tight—is furnished with each pump. It quickly sets and when properly used the pipeline will never cause trouble from leakage.

Drip Pan: 12 in. diameter, with mat, is furnished without extra cost when equipment is intended for oil.



Measuring cylinder: The detached measuring cylinder is made of 12-gauge seamless brass tubing, fitted with solid heads and protected by four $1\frac{1}{2}$ " steel tie rods. It is fitted with adjustable pedestal, simplifying its installation.

Your attention is called to the emergency drain which is made a part of this drop cylinder. It allows the liquid to be drawn without waste from the riser pipe should any repair or adjusting ever be necessary.

Cut 218 Pump Accessories

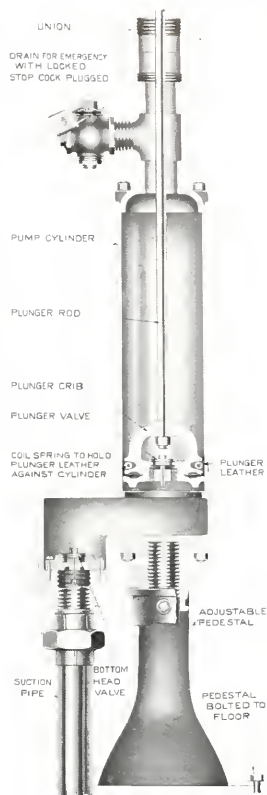
The following accessories are furnished at extra cost, and, while not absolutely necessary to the operation of the pump, increase its convenience and usefulness.

Meter (Bulletin 90) is furnished, when wanted. It keeps an accurate and continuous record of the liquid pumped up to 100,000 gallons and then repeats. Convenient for daily or monthly invoicing. Sealed and cannot be tampered with.

Nozzle Gasoline Filter—Cut 47 (Bulletin 47.) If the pump is used for gasoline, it is well to attach the gasoline filter. It will eliminate any water and dirt that may be in the liquid and can be easily and quickly cleaned.

Two-way Nozzle, Automatic Hose Draining Valve and Portable Hose and Hose Tube can be attached to any Cut 218 pump, making it possible to discharge the liquid directly into vat or mixing tank in factory. The pump discharge can be fitted with two-way nozzle and may be connected to iron pipe running to place of discharge or may be fitted with hose and hose tube. (Bulletin 97.)

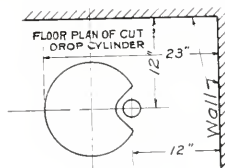
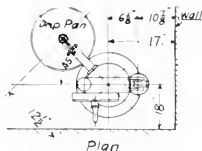
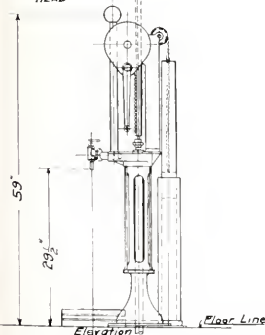
Suction Pipe from tank to drop cylinder is standard $1\frac{1}{2}$ " or 2" galvanized pipe. 2" recommended for heavy liquids. Mention size wanted—either $1\frac{1}{2}$ " or 2". This pipe is standard galvanized and can be bought from your local dealer.



Measuring Cylinder

MODEL 11' PUMP-CUT 218
WAYNE OIL TANK AND PUMP CO.
FORT WAYNE, IND. MAR. 20, 1916

INSTALLATION OF
CUT 218 PUMP
HEAD

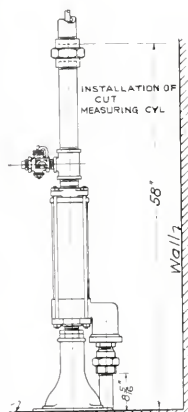


Installation Plans of Pump Head and Drop Cylinder of
Cut 218 Pump, Showing Distance Pump Should
Be Set From Wall, Etc.

INSTRUCTIONS FOR ORDERING: In ordering this equipment, it is absolutely necessary to give the exact distance between top of floor which the pump is set on and the floor, or foundation, that drop cylinder is set on.

To find cost of riser pipe (pipe from drop cylinder to pump) necessary deduct 55 feet, which is furnished with each outfit without extra cost (see price sheet), and compute balance according to price per foot given in price book.

The suction pipe (pipe from tank to drop cylinder) can be furnished at extra cost (see price sheet) or bought locally. We recommend 2" for heavy oils, such as cylinder oil, varnishes, linseeds, etc., and $1\frac{1}{2}$ " for kerosene, gasoline, or light lubricating oils.





A TYPICAL INSTALLATION showing underground cylindrical tanks for one grade of gasoline and one grade of linseed oil.

You will notice that Cut 218 counterbalance pump delivers on the sixth floor of the building where liquid is used—saving time, labor and expense.

Our Engineering Department will be glad to assist in planning the most economical way to solve your oil storage problems. Our twenty-five years of experience will be of service to you and there will be no obligation on your part.

See Bulletin 89 for data on Rectangular Tanks.

See Bulletin 88 for data on Cylindrical Tanks.

See Bulletin 268 for data on High Lift Pump.

See Bulletins 22, 32 and 278 for data on Long Distance Pumps.

See Bulletins 35 and 65 for data on small Lubricating Storage Tanks.

See Bulletins 70 and 82 for data on Small Paint Oil Storage Tanks.



Portable Wheel Tank

FOR THE

Storage and Distribution of Lubricating Oils and Like Liquids

BULLETIN No. 227



Standard Cut 227—Portable Wheel Tank

This equipment is used extensively for distributing liquids in garages, factories and mills. It will be found very convenient for filling cars at the curb or in the garage. Capacity 65 gallons. Equipped standard with quart pump.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

The Cut 227 Wheel Tank will be found a necessity in Garages where oil is measured and delivered in small quantities to cars. It can be readily moved from place to place, doing away with the carrying of oil in measures.

Placed at the curb, its attractive appearance and convenience will sell many gallons of oil that would otherwise not be thought of or would be bought elsewhere.

Many factories use this equipment for delivering cutting oil and compounds to automatic machines. It will measure the liquid correctly to each machine, there will be no waste, and the untidy condition due to spillage existing around machines and tools will be entirely eliminated.

Where oil-house is remote from factory and consumption of lubricating oil is limited it is sometimes found more economical to use the Cut 227, filling it at the oil-house and loading it directly on truck, than to install expensive pipe-lines.

Equipped Standard with quart pump. Can be fitted with meter, making it possible to keep an exact account of all oil delivered. Its capacity of 65 gallons allows a full barrel to be put into the tank at one time and does away with the necessity

The Tank is built of heavy gauge steel, welded throughout, forming a solid container (no seams) which insures the equipment against leakage.

The Pump is our standard quart per stroke, which correctly measures half-pints, pints or quarts by simply pushing the quantity stop to its proper position. Brass valves and valve strainer, anti-drip nozzle are furnished standard.

Drip Tube: 6". Hinged. With drip pan, strainer, padlock and two keys. Arranged to fit closely over discharge nozzle when pump is not in use, practically eliminating dust and dirt.

Accessories Extra

Meter. Cut 90, Bulletin 90. For quart or gallon pump.

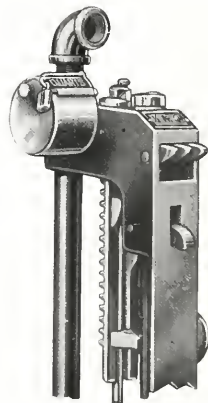
Transfer Pump. Cut No. 14, Bulletin 100, for transferring liquid from barrel to tank.

Barrel Pump. Cut No. 132, Bulletin 100.

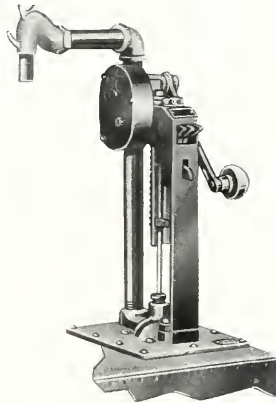
Drip Pan. With hinged cover and drip-tube with padlock and two keys.

Nozzle. Anti-drip.

Wheels. 16" diameter. Guide wheel 6" diameter.



Cut 227 Pump Head, showing quart meter attached. This meter is supplied at additional cost.



Cut 227 Pump Head, showing back gearing for heavy oils such as 600W. Back gearing supplied at additional cost.

of providing reserve storage. The pump being equipped with anti-drip nozzle, the outfit can be kept clean, and the drip-tube closing over the nozzle when the pump is not in use makes the equipment practically dust-proof, keeping the oil pure and free from grit.

The Cut 227 Standard Equipment consists of the following:

Tank. 65 gallons capacity.

Pump. Quart. Self-measuring (half-pints, pints or quarts).

Axle. 1 1/4". Steel. Running entirely under the tank, with machined bearings and steel hub caps.

Dimensions Over All. Height 40", width 32", length 46".

Finish. Tank, dark green enamel. Pump, japanned with nickel trimmings.

Variations from Standard

The equipment is standard with quart pump but can be furnished with gallon pump and meter.

Equipment will not be furnished in any other capacity than 65 gallons.

REG. U. S.
Wayne
TRADE MARK

Portable Gasoline Storage System

BULLETIN No. 228



Cut No. 228

This Wayne Portable Outfit facilitates the filling of cars and eliminates the necessity of maneuvering them. It may be used either in the garage or at the curb.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

General Description Cut 228

The tank of this Wayne Portable is constructed of 3 16" steel plate, with all seams oxy-acetylene welded. The wheels are attached directly to the axle, and the axles pass directly through the tank and are welded and made a part of the tank. A heavy stiffener or spreader is used on the inside to eliminate the strain on the sides of the tank which would ordinarily result without the use of this stiffener. The tank is mounted on rubber tired steel wheels, roller bearing. The guide wheel in front is made of fibre and is noiseless. The tank is provided with a handle and a brake which will permit you to hold the outfit rigidly at any point.

UNDERWRITERS' LABORATORIES, Inc.
INSPECTED
PORTABLE TANK FOR HAZARDOUS FLUIDS.
No. [REDACTED]

DO NOT FILL FROM OPEN VESSELS. STORE TANK WHERE IT MAY BE RUN OUTSIDE QUICKLY IN CASE OF FIRE. AVOID SPILLING OR EXPOSURE OF CONTENTS. KEEP TANK AWAY FROM RADIATORS OR OTHER SOURCES OF HEAT. USE NO OPEN FLAME IN VICINITY.

This equipment is built to conform with that measure of safety prescribed by the **National Board of Fire Underwriters** and is labeled under their supervision when used for volatile liquids, such as gasoline and naphtha.

DETAILED DESCRIPTION

Wheels: The wheels used with this outfit are made from steel stampings, spot welded, and are provided with roller bearings. Each wheel is fitted with a heavy rubber cushion tire. These large wheels are attached to the tank in such a manner that the weight is carefully adjusted, which assists materially in eliminating the excess effort usually required for propelling a device of this kind. One small fibre guide wheel is used in front, and provided with a swivel.

Brakes: The large wheels used on this outfit are provided with steel brakes, which are operated with a lever placed conveniently near the rear handle. Attached to and made a part of this brake are two malleable iron castings which serve as supports when the tank is at rest.

Gauge: This tank is provided with a Magnetic Float Gauge, which indicates the amount of gasoline in the tank at any time. The dial shows the reading of the gauge and is amply protected against damage.

Fill Pipe: The fill pipe used in connection with this extends from the top of the tank to within an inch of the bottom and is 1 7/16" in diameter. It is fitted with a double screen strainer. The upper

strainer is cone-shaped and removable. It is so constructed to give ample space for releasing the air when filling, which permits a free flow of gasoline. The upper end of this fill pipe is provided with a polished cap and a vented closing plug. The fill cap and pipe lock.

Pump: The pump used with this outfit is our standard Cut 360. It will be provided standard, with a discharge register, locking device, overhead discharge, seven feet of special gasoline hose and a filling nozzle. The discharge register automatically records the number of gallons pumped up to ten.

Air Release Valve: The Air Release Valve allows the hose to drain after each pumping operation, thereby lengthening the life of the hose.

Special Gasoline Hose: This hose permits the operator to discharge the gasoline directly into the reservoir of the automobile. The hose supplied with this outfit is of superior quality and will give excellent service. It has a steel lining on the inside.

Tank: The tank furnished with this outfit is made of the best grade 3 16" tank steel. All seams are oxy-acetylene welded, and it has a capacity of 50 gallons.

Finish: The outfit is given three coats of mineral paint and is finished in a red enamel.

Dimensions: (Approximate).

Length (front to back) over all, 43 inches

Width over all, 30 inches.

Height over all, 80 inches.

Equipment: The Standard Equipment includes the following: Tank complete, Magnetic Float Gauge, Fill Pipe, Seven Feet of Special Gasoline Hose, Overhead Drain Valve, Globe Valve, Filling Nozzle, and Discharge Register; also locks for pump and fill pipe. Labeled by the underwriters.

Accessories Extra: 100,000 Gallon Meter records each gallon discharged from the pump.

Autograph Register: When specially ordered, this outfit will be furnished with a nickel-plated triplicate Autograph Register, which affords an excellent means for recording all sales.

Special Notice: This pump will handle straight run gasoline testing not more than 66 degrees. No guarantee can be made on handling blended gasoline unless we know the amount of casing head gas used and the test of the gasoline used for the blend. Where there is any question on this point a sample of the liquid should be sent in for test.



Portable Combination Wheel Tank

For the Storage and Distribution of Gasoline and Lubricating Oil

BULLETIN No. 230



Standard Cut 230—Portable Wheel Tank

Consists of 50-gallon gasoline tank fitted with gallon pump and 10-gallon lubricating compartment fitted with pint pump.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

General Description Cut 230

The Cut 230 Portable Wheel Tank will be found very convenient for the distribution of gasoline and oil at the curb or throughout the garage.

Equipped with large rubber tired wheels, properly balancing the equipment, it can easily be moved about and will save considerable time for the user.

UNDERWRITERS' LABORATORIES, INC.
INSPECTED
PORTABLE TANK FOR HAZARDOUS FLUIDS.

No. [REDACTED]

DO NOT FILL FROM OPEN VESSELS. STORE TANK WHERE IT MAY BE RUN OUTSIDE QUICKLY IN CASE OF FIRE. AVOID SPILLING OR EXPOSURE OF CONTENTS. KEEP TANK AWAY FROM RADIATORS OR OTHER SOURCES OF HEAT. USE NO OPEN FLAME IN VICINITY.

This equipment is built to conform with that measure of safety prescribed by the **National Board of Fire Underwriters** and is labeled under their supervision when used for volatile liquids, such as gasoline and naphtha.

Wheels: The wheels used with this outfit are constructed of steel plate, spot welded, and provided with steel brakes which are operated with a lever placed conveniently near the rear handle. Attached to and made part of this brake are two malleable iron castings which serve as a support when the tank is at rest. The large wheels, equipped with roller bearings, are attached to the axle in such a manner that the weight is carefully adjusted. This assists materially in eliminating the excess effort usually required for propelling a device of this kind. The axle extends through the tank and is welded inside and out. A small fibre guide wheel is used in front, to more easily guide the equipment.

Gauge: This tank is provided with a Magnetic Float Gauge, which indicates the amount of gasoline in the tank at any time. The dial which shows the reading of the gauge is amply protected against damage.

Fill Pipe: The fill pipe on the large tank extends from the top of the tank to within an inch of the bottom and is 1 7-16" in diameter. It is fitted with a double screen strainer. The upper strainer is cone-shaped and removable. It is so constructed to give ample space for releasing the air when filling, which permits a free

flow of gasoline. The upper end of this fill pipe is provided with a polished cap and a vented closing plug. The fill cap and pipe are provided with a lock.

Filling the small, or lubricating tank, is accomplished through a special fill flange and cap as shown in cut.

Pump: The pump used with this outfit is our standard first floor Cut 360. It will be provided standard, with a discharge register, locking device, overhead discharge, seven feet of special gasoline hose and a filling nozzle. The discharge register automatically records the number of gallons pumped up to ten.

The lubricating tank is fitted with our standard pint per stroke pump and drip tube as shown in cut, making the equipment practically dust-proof.

Special Gasoline Hose: This hose permits the operator to discharge the gasoline directly into the reservoir of the automobile. The hose supplied with this outfit is of superior quality and will give excellent service. It has a steel lining on the inside.

Tank: The large tank is made of the best grade 3-16" black steel, all seams oxy-acetyline welded, having a capacity of 50 gallons. The small tank is built of 3-16" black steel, all seams are oxy-acetyline welded, and has a capacity of 10 gallons.

Finish: Tanks are finished in red and green. Pumps are Japanned in black and red with nickel trimmings.

Dimensions: (Approximate) Length (front to back) over all, 43 inches, width over all, 30 inches, height over all, 80 inches.

Equipment: The standard equipment includes the following: Tank complete, Magnetic Float Gauge, Fill Pipe, 7 feet of Special Gasoline Hose, Filling Nozzle and Discharge Register, Locks for pump and Fill Tube on the large tank. On the small tank, (pint pump) Drip Pan and Tube, special Filling Flange with Cap and Locks for Pump.

Special Notice:—This outfit will handle straight run gasoline testing not more than 68 degrees and blended gasoline testing not over 64 degrees. If higher test gasoline is to be used consult the factory.



Storage Systems for Oils and Gasoline

BULLETIN No. 232



Cut No. 232

The illustration above shows a twin installation of the Cut 364 pumps. One of these is designed for gasoline and one for kerosene. This arrangement is ideal for the grocery store or other place of business where both kerosene and gasoline are handled.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

General Description

These pumps are the long distance type. That means the pumps can be set in the building wherever desired and the storage tanks, to which they are connected are buried in the ground outside, usually where it is the most convenient for filling. The pumps and tanks are both provided with a lock. Nobody can get oil or gasoline unless they have a key.

They are especially designed for retail purposes and are made of selected materials throughout. The pumps are thoroughly tested for soundness of construction and accuracy of measurement. They are positively guaranteed to be free from imperfections in either material or workmanship. The measuring cylinder is made of seamless brass tubing. The heavy double plunger, also the top and bottom castings of the measuring chamber, are thoroughly galvanized. This method of construction prevents corrosion and rust which is obviously a striking advantage where gasoline is handled. It measures gallons, half-gallons or quarts at a stroke. The discharge register counts the gallons up to ten and then repeats. This device is especially valuable in filling five and ten-gallon cans. These pumps are also provided with a computing dial which shows just how much to charge for odd quantities.

The pump for gasoline will be finished in red enamel and the pump for kerosene in black enamel. This method will avoid any possibility of mistakes and lends considerable attractiveness to the installation.

VALVES: The suction line is provided with a set of double brass valves. The accuracy of any measuring pump depends primarily upon these valves. In purchasing, this point should be thoroughly investigated. Too much stress cannot be laid upon their construction and arrangement. These valves in the Wayne System are made entirely of brass. The poppet or seat are carefully machined and then hand ground. The heavy body in which these valves are set is solid brass. Each valve works independently of the other. After this care in construction all valves are tested under heavy pressure to eliminate any possibility of leaks.

DISCHARGE PIPE: The discharge pipe terminates in a lever shut-off nozzle, making it evaporation proof.

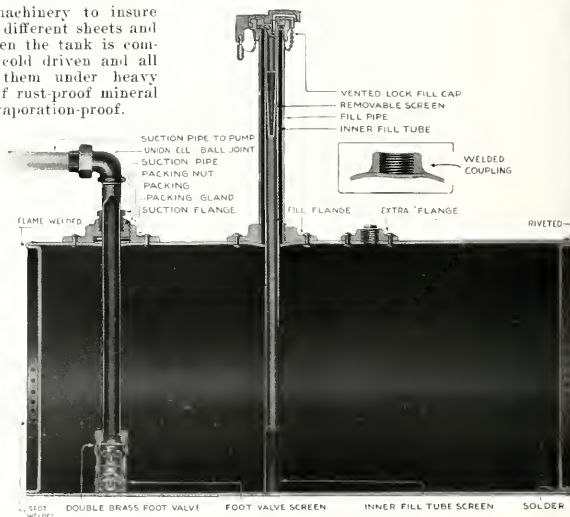
SPACE REQUIRED: This pump occupies approximately one square foot of floor space. It should stand at least twelve inches from the wall. This distance varies somewhat according to the location of the pump in the building. Seventy inch head room is required to allow full stroke of cog bar.

TANKS: The tanks used with this pump can be furnished in any capacity or thickness of metal desired. They are made standard in 16, 14 and 12 gauge galvanized steel, ranging in capacities from 1 bbl. (63 gals.) to 20 bbls. (1,100 gals.). Tanks of larger capacity or of heavier metal are made special.

All spacing and punching is done by machinery to insure accuracy. This guarantees a perfect fit of the different sheets and prevents bulging or warping of the metal when the tank is completed. The rivets on the lighter tanks are cold driven and all seams thoroughly soldered. After testing them under heavy air pressure the tanks are given three coats of rust-proof mineral paint. They are guaranteed both leak and evaporation-proof.

DIMENSIONS: *Standard tanks are made in the following sizes:

Capacity bbls.	Capacity gallons	Diameter inches	Length inches
1	63	27	30
2	120	31	42
5	280	38	61
9	500	38	109
10	550	38	118
12	640	46	94
15	800	46	117
18	1000	46	146
20	1100	46	160



EQUIPMENT: The standard equipment includes the following: Pump, Type "A" Nozzle, Lock, Discharge Register, Tank, Gauge Stick for Tank, Fill Pipe complete, Foot Valves, Suction Pipe for Tank with Union (pipe from union to pump not included).

Note: No drip pan furnished where sold for gasoline.

*The standard fill pipe is 20" high from top of tank. To find the depth of the excavation necessary to bury the tank, add diameter of tank to length of fill pipe, allowing about six inches of the fill pipe to extend above ground.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.



Globe

An ornamental glass globe, lettering sand blasted, thus preventing cracking and peeling, which is always occurs when lettering is painted on—16 inches in diameter, with high-powered lamp inside.

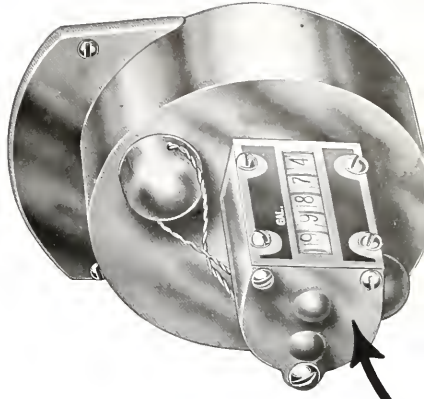


Dial

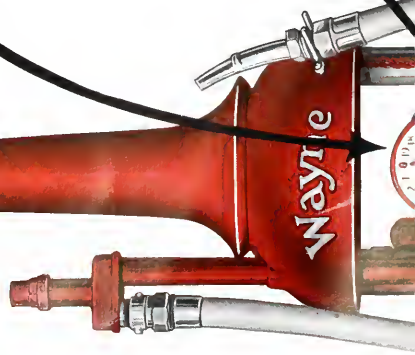
A twenty-gallon irreversible discharge register, shows exactly how many gallons have been discharged. Aluminum faced, numbered in red and black. Illuminated by dome light.

Automatic Trip

A lever device which enables the operator to return the plunger to the bottom by simply pushing up on this trip.



Meter



Fifteen Advantages of the Wayne Monarch

**FILTERED
GASOLINE**

Overhead Drain Valve

A valve arrangement which automatically drains the hose, thus lengthening its life.

Yale Lock and Hose

Cylindrical housing equipped with Yale lock at top of frame. Prevents use of pump by unauthorized persons. Pump is equipped with 10 feet of special Triplexed hose and nozzle.

Pump Adjustments

These are arranged with a locking and sealing device which makes them fool-proof. They comply with requirements of all scales of weights and measures.

Dome Light

A high-powered electric light arranged under the dome-like housing, lights at night when pump is open, shuts off when closed.

Shut Off Valve

An accurately ground, guaranteed quick-action valve enabling operator to shut off the discharge of liquid at his option.

Pump Operation

This is the only continuous forward motion pump on the market. No backward strokes required. Fifteen revolutions discharge five gallons and return the plunger.

Cylindrical Housing

This is hung on counterbalanced weights, slides up and down like a window. Locks with Yale lock at top.

Quantity Pointer

This pointer shows instantly exactly how much liquid has been discharged from the pump.

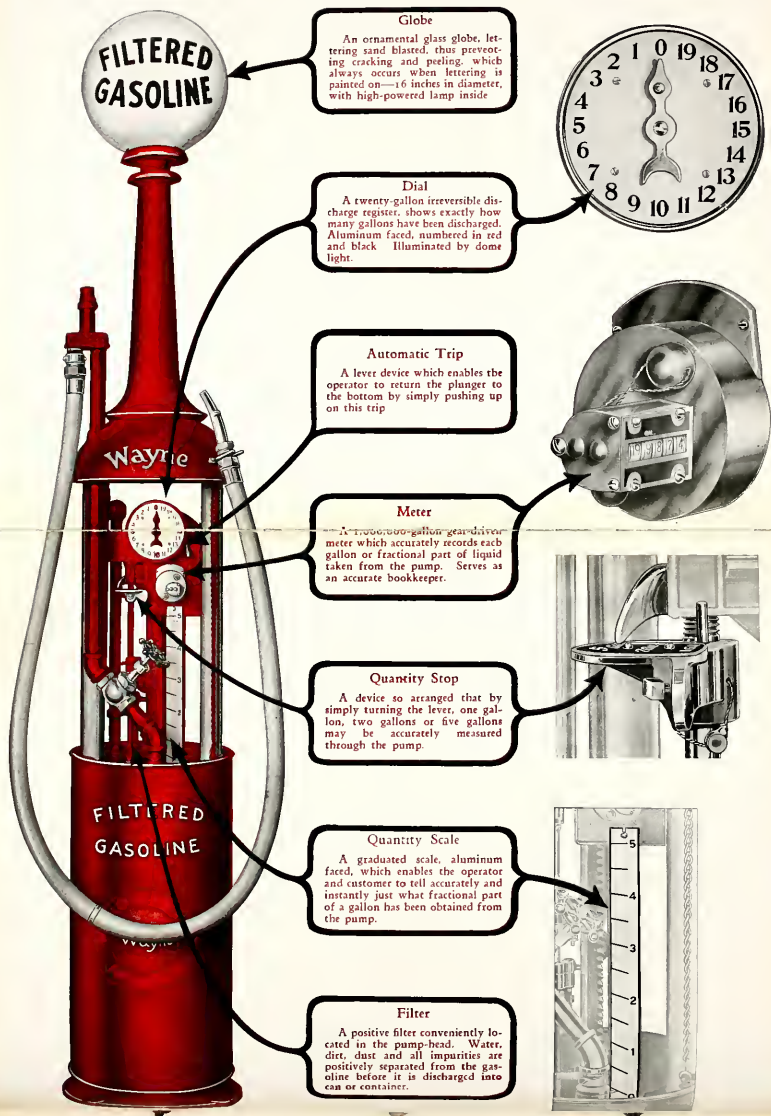
**FILTERED
GASOLINE**

The Wayne Monarch Cut 276

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.



gallon or fractional part of liquid taken from the pump. Serves as an accurate bookkeeper.

Quantity Stop

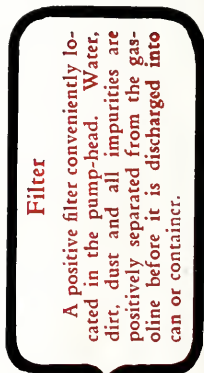
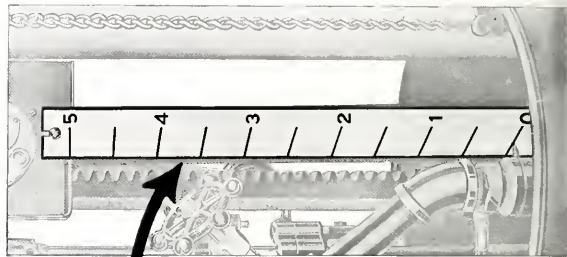
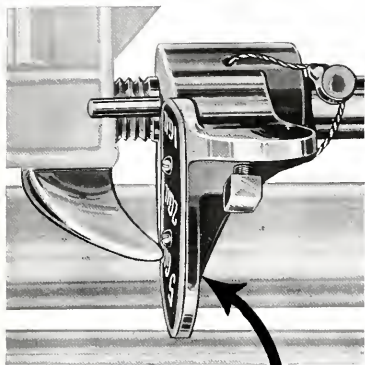
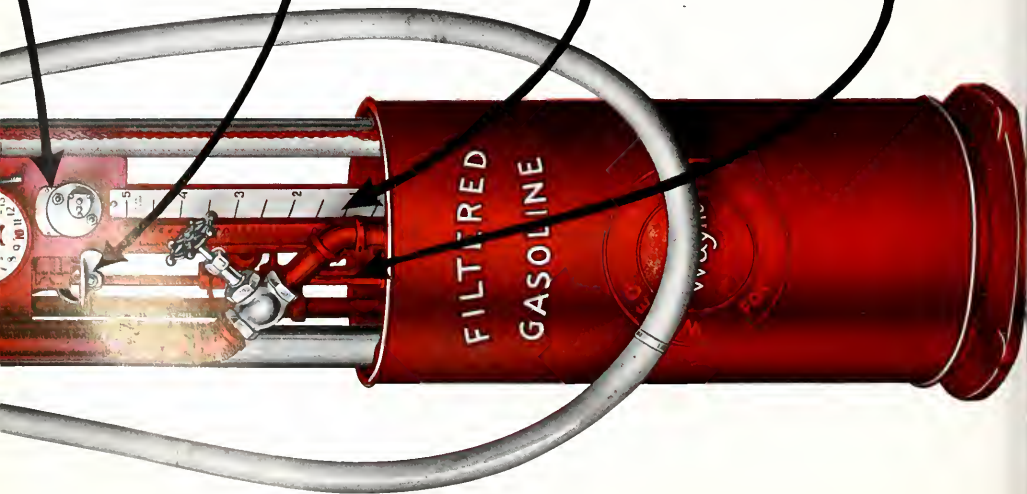
A device so arranged that by simply turning the lever, one gallon, two gallons or five gallons may be accurately measured through the pump.

Quantity Scale

A graduated scale, aluminum faced, which enables the operator and customer to tell accurately and instantly just what fractional part of a gallon has been obtained from the pump.

Filter

A positive filter conveniently located in the pump-head. Water, dirt, dust and all impurities are positively separated from the gasoline before it is discharged into can or container.





Sidewalk Pump for Gasoline

BULLETIN 302

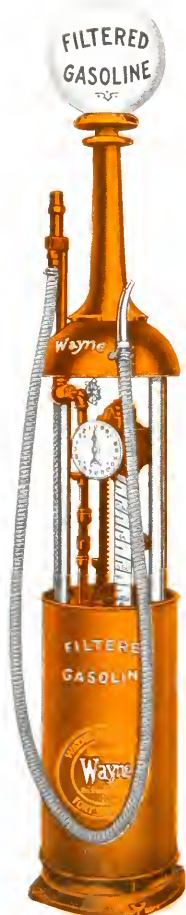
**Practical
Efficient
Economical
Dependable**

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

FORT WAYNE, INDIANA, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems—
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating



Cut 302

BULLETIN No. 302

General Description

Cut No. 302

This pump is the long-distance type. The storage tank to which it is attached may be buried underground at any convenient point for filling. The pump and tank are connected by a 1½-inch pipe line. The pump is especially designed for sidewalk installation. The dome and light standard are made of heavy cast iron. The housing is constructed of heavy sheet steel, rolled. Special reinforcements are used on this housing at the top and bottom. The housing closes and locks, thoroughly protecting the working parts of the pump from the elements.

The pump is held in place by expansion bolts or lag screws and is finished in a beautiful orange enamel, lettered in gold.

Valves: The suction line is provided with a set of double brass valves. The accuracy of any measuring pump depends primarily upon these valves. In purchasing, this point should be thoroughly investigated. Too much stress cannot be laid upon their construction and arrangement. These valves in the Wayne System are made entirely of brass. The poppet and seat are carefully machined and then hand ground to seat. The body in which these valves are set is solid brass. Each valve works independently of the other. After this care in construction all the valves are tested under heavy pressure to eliminate any possibility of leaks.

Housing: This pump is provided with a circular housing which telescopes the pedestal of the pump when it is opened. The housing is operated by means of chains and counter-weights. These counter-weights operate inside of the supporting columns to the dome and the chains are run over pulleys, making the pump operate much like a weighted window. There is a distinct advantage in this construction as the pump occupies no more room when it is open than it does when it is closed. In addition to this the housing and pedestal are made of sheet steel, thus avoiding the breakage which is liable to occur on pumps constructed of cast iron. This housing is provided with a special Yale lock which snaps shut when the housing is pushed up. A handle is provided on the side of the housing to permit the operator to raise and lower it with ease.

Pump Operation: The operating method is our quick return, continuous acting type—which marks a big improvement in the design of pumps for measured flow.

A forward stroke is the only stroke required to operate this Wayne Pump No. 302—there is no “back cranking” or reverse motion of the pump lever or crank required. The raising or lowering of the plunger is controlled by a special automatic trip which operates when the pump lever reaches the limit of the upward or downward stroke, shifting the action as may be required. In the delivery or suction stroke the plunger is raised on a gear that requires 7 turns of the handle to discharge 2 gallons of gasoline, while the reverse stroke (which requires no change in stroke direction) requires but 3 turns to bring the plunger back to zero. This makes a total of 10 turns of the lever or crank to make a complete delivery of the 2 gallons, and will be found much faster than the method of reverse cranking after delivery.

A special hand trip permits the operator to return the plunger to zero at any time during the upward stroke.

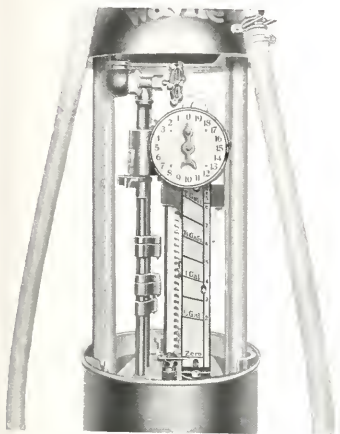
Light Standard: This pump is fitted with a light standard made of heavy cast iron. A rigid conduit is run from the base of the pump up through this light standard and the wiring is attached to a special weather proof socket. A 14-inch round glass globe with sand blast lettering surmounts the upper part of the electric light post.

Discharge Points: The discharge extends above the pump terminating in a hose draining valve. The hose is attached to this valve as shown in the illustration. Each time the pump is operated the gasoline is drained from the hose. The discharge pipe up to the hose draining valve is 1-inch galvanized. The hose used on this pump is 1-inch.



View of Pump
Closed

Space Required: This pump occupies approximately $1\frac{1}{2}$ square feet of space. It stands 8 feet 6 inches over all and the base diameter is $16\frac{1}{4}$ inches. The pump requires 10 turns to discharge 2 gallons—7 turns to raise the plunger to its extreme height and 3 turns to return it.



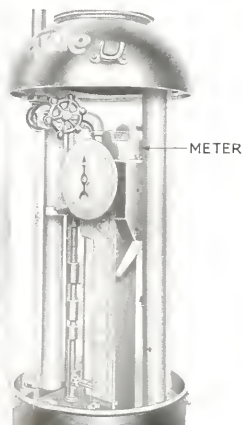
This illustration shows in detail the 20-gallon discharge register, computer and quantity stops

Discharge Register and Computer: The illustration opposite shows in detail the twenty-gallon discharge register provided with this pump. This register is located on the street side of the pump in plain view of the purchaser. The dial is aluminum and the figures are black with the exception of 0, 5, 10 and 15, which are red. Each gallon that is pumped is counted on this register dial, showing the purchaser exactly what he is getting. The computer is provided so the operator can tell what fractional part of a gallon has been discharged. Frequently an operator is compelled to stop pumping before a definite predetermined quantity has been discharged. By glancing at the computer the operator can tell what part of a gallon has been discharged and make his price accordingly. The twenty-gallon discharge register is an exclusive feature on Wayne pumps.

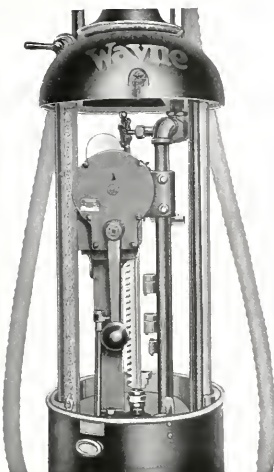
Quantity Stops: Particular attention is called to the quantity stops or regulator lever located immediately below and to the left of the discharge dial. By simply turning this lever a slight distance to either the right or left, quarts, half-gallons, gallons or two gallons may be easily and accurately discharged. If the operator wants a quart, he turns the lever to the position marked $\frac{1}{4}$. This is a positive operation. Changes in the quantity desired can be easily and quickly made by moving this lever. The entire regulator is conveniently located directly in front of the operator and at a most convenient height. All Wayne Quantity Stops are located away from the discharge points in such a way that the hands of the operator are never soiled in changing the discharge of the pump from one quantity to another.

Meter: The illustration opposite shows the 100,000 gallon meter mounted at the top of the pump head. This meter accurately records all gasoline passing through the pump, regardless of the quantity, up to 100,000 and repeats when this quantity is reached. It is a compensating meter geared directly to the cog-rack. It can be adjusted to the slightly varying stroke of the pump should correction of the measurement be required.

Filter: This pump is provided with a Wayne special filter which is guaranteed to separate water and other impurities from the gasoline. It is so constructed that the water and impurities taken from the gasoline are held in a special chamber in the pump head and may be discharged through the special filter draw-off. Special attention is called to the fact that the Wayne filter on this type of pump is an integral part of it. It is entirely enclosed, reducing the possibility of damage and eliminating the extra joints or connections necessary when the old style outside filter is used. Until this Wayne design was marketed it was customary to attach a cylindrical filter to the outside of the pump. The objections to that method are obvious. This filter insures clean, powerful gasoline to all customers.



This illustration shows the 100,000 gallon meter



This Illustration Shows the Filter Drain Off Valve

Filter Drain: The illustration to the left shows the Filter Drain. This device is one fundamentally intended for use in draining the water from the pump. This drain valve extends down to the base of the pump head where the water from the gasoline is retained. Water, being heavier than gasoline, falls to the bottom of the bowl-like head. The drain valve offers a means of discharging this water from the pump. In cold weather it is advisable to drain the water from the pump at least once a day. This will prevent the valves from freezing.

Equipment: The standard equipment for this Wayne Pump includes overhead discharge complete, 10 feet of hose, curved discharge bib, computer, discharge register, filter, meter, foot valves. Where tank is included with the order the following additional equipment is supplied: Gauge stick for tank, fill pipe assembly complete, suction pipe with union for tank. Pipe from tank union to pump is not included.

Space Required: This pump is 16 $\frac{1}{4}$ in. in diameter and 8 ft. 6 in. high over all. It is provided with a 1 $\frac{1}{2}$ -in. suction line and the discharge pipe up to the hose-draining valve is 1 in. The hose is 1 in.

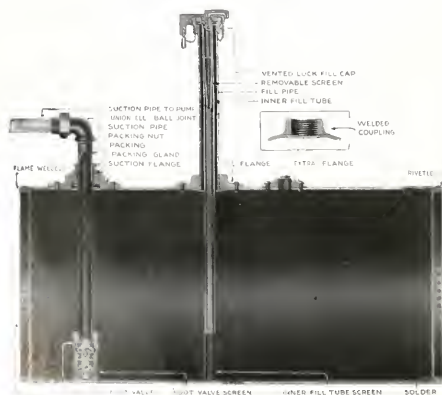
The telescoping housing on this pump is so arranged that the pump requires no more space open than closed.

Tanks: Tanks regularly supplied on order for use with Wayne Pump No. 302 are made in 14 or 12-gauge galvanized steel according to the storage capacity required. Tanks of this material range in capacity from 1 barrel (63 gallons) to 10 barrels (550 gallons). Larger capacity tanks of heavier material can be furnished when necessary or desired.

All our spacing and punching is done by machinery to insure accuracy. This guarantees a perfect fit of the different sheets and prevents any bulging or warping of the metal when the tank is completed. The rivets on the lighter tanks are cold driven and the seams thoroughly soldered inside and out. After testing them under air pressure the tanks are given three coats of rust-proof mineral paint. They are guaranteed both leak and evaporation proof.

Tank Dimensions: *Standard tanks are made in the following sizes:

Capacity bbls.	Capacity gallons	Diameter inches	Length inches	Capacity bbls.	Capacity gallons	Diameter inches	Length inches
1	63	27	30	9	500	38	107
2	120	31	42	10	550	38	118
5	280	38	61				



Sectional View of Underground Tank

ACTUAL THICKNESS		
GAUGE		Part of Inch
NO 16		$\frac{1}{16}$
NO 14		$\frac{3}{16}$
NO 12		$\frac{3}{16}$
$\frac{3}{16}$ IN.		$\frac{3}{16}$
$\frac{1}{4}$ IN.		$\frac{1}{4}$

View Showing Thickness of Metal

*The standard fill pipe is 30 inches high from top of tank. To find the depth of the excavation necessary to bury the tank, add diameter of tank to length of fill pipe, allowing about 6 inches of the fill pipe to extend above ground.



Volatile Liquids

Requiring Evaporation-proof Outfits Such as Cuts Nos. 228, 73, 71, 82 and Type A or S Tanks in Connection with Any Long Distance Pump

BULLETIN No. 310

Liquid	Tank	Steam Coil	Pump
Acetone	Galvanized		Standard
Alcohol—Ethyl (Grain)	Tin Lined (or Black)		Tinned (or Brass Parts Tinned & Black)
Alcohol—Methyl (Wood)	Tin Lined (or Black)		Tinned (or Brass Parts Tinned & Black)
Alcohol—Denatured (With Wood Alcohol)	Tin Lined (or Black)		Tinned (or Brass Parts Tinned & Black)
Amyl Hydride Oil	Black or Galvanized		Standard
Anis Oil	Tin Lined		Tinned
Balsam Fir Oil	Tin Lined		Tinned
Balsam Copaiba Oil	Galvanized		Brass Parts Tinned and Galvanized
Benzene (Benzol)—Coal Tar	Black or Galvanized	?	Standard
Benzine (Benzol)—Petroleum	Black or Galvanized		Standard
Bitter Almond Oil	Tin Lined		Tinned
Blown Oil—Vegetable	Black or Galvanized		Standard—Back Gear
Boulevard Gas Oil	Black or Galvanized		Standard
Bung Hole Oil	Black or Galvanized		Standard
Carbon Tetrachloride	Black or Galvanized		Standard
Carbon Bi-Sulphide	Galvanized		Brass Parts Tinned and Galvanized
Casing Head Gasoline	Black or Galvanized		Standard
Cassia Oil	Tin Lined		Tinned
Castor Oil—Deodorized, Medicinal	Tin Lined		Tinned
Castor Oil—Natural (Commercial)	Galvanized		Brass Parts Tinned and Galvanized
Cedar Oil	Galvanized		Brass Parts Tinned and Galvanized
China Wood Oil	Black or Galvanized	Yes	Standard
Chloroform	Galvanized		Brass Parts Tinned and Galvanized
Cinnamon Oil	Galvanized		Brass Parts Tinned and Galvanized
Citronella Oil	Galvanized		Brass Parts Tinned and Galvanized
Cleansing Oil	Black or Galvanized		Standard
Corn Oil	Black or Galvanized		Brass Parts Tinned and Galvanized
Collodion	Tin Lined		Tinned
Condensed Milk	Tin Lined		Tinned
Cymogene	Black or Galvanized		Standard
Danforth's Oil	Black or Galvanized		Standard
Deodorized Naphtha	Black or Galvanized		Standard
Dry Cleaners Oil	Black or Galvanized		Standard
Dryer, Japan	Black or Galvanized		Standard
Dryer, Turpentine	Black or Galvanized		Brass Parts Tinned and Galvanized
Ether—Petroleum	Black or Galvanized		Standard
Fish Oil	Black or Galvanized		Standard
Fish Oil—Drug Use	Galvanized		Brass Parts Tinned and Galvanized
Fusel Oil	Tin Lined		Tinned
Gasoline	Black or Galvanized		Standard
Gloss Oil	Black or Galvanized		Standard
Glucose	Galvanized	Yes	Brass Parts Tinned and Galvanized
Hard Oil Finish	Galvanized		Brass Parts Tinned and Galvanized
Hemlock Oil	Black		Tinned (or Brass Parts Tinned & Black)
Ink—Bottom	Black or Galvanized		Standard
Ink—Black Edge Filler	Galvanized		Brass Parts Tinned and Galvanized
Ink—Black Setting	Galvanized		Brass Parts Tinned and Galvanized
Ink—Edge	Black or Galvanized		Standard
Ink—First Coat Dye	Galvanized		Brass Parts Tinned and Galvanized
Ink—Heal Blacking	Black or Galvanized		Standard
Ink—Light Edge Filler	Galvanized		Brass Part Tinned and Galvanized
Ink—Shank Blacking	Galvanized		Brass Part Tinned and Galvanized
Japalae	Galvanized		Brass Part Tinned and Galvanized
Japan	Galvanized		Brass Part Tinned and Galvanized
Light Petroleum	Black or Galvanized		Standard
Linseed Oil—Boiled	Black or Galvanized		Standard
Linseed Oil—Blown	Black or Galvanized		Standard—Back Gear
Linseed Oil—Raw	Black or Galvanized		Standard
Malt Extract	Galvanized		Brass Parts Tinned and Galvanized

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

Liquid	Tank	Steam Coil	Pump
Menhaden Oil	Black or Galvanized		Standard
Mineral Turpentine	Black or Galvanized		Standard
Naphtha—Coal Tar	Black or Galvanized		Standard
Naphtha—Petroleum	Black or Galvanized		Standard
Oleic Acid	Tin Lined (or black)		Tinned (or Brass Parts Tinned & Black)
Paint Thinner—Petroleum	Black or Galvanized		Standard
Peach Kernel Oil	Tin Lined		Tinned
Pennyroyal Oil	Tin Lined		Tinned
Peppermint Oil	Tin Lined		Tinned
Petrol	Black or Galvanized		Standard
Rape Oil	Black or Galvanized		Standard
Rhigolene	Black or Galvanized		Standard
Rubber Cement	Black or Galvanized		Standard
Sassafras Oil	Tin Lined		Tinned
Shale—Spirits	Black or Galvanized		Standard
Shellac—Grain Alcohol Solvent	Tin Lined,—Agitator		Tinned
Shellac—Wood Alcohol Solvent	Tin Lined,—Agitator		Tinned
Shellac—Denatured Alcohol Solvent	Tin Lined,—Agitator		Tinned
Sherwood Oil	Black or Galvanized		Standard
Silicate of Soda	Galvanized		Brass Parts Tinned and Galvanized
Solvent Naphtha	Black or Galvanized		Standard
Toluol	Black or Galvanized		Standard
Tops	Black or Galvanized		Standard
Tung Oil	Black or Galvanized	Yes	Standard
Turpentine, Commercial	Galvanized		Brass Parts Tinned and Galvanized
Turpentine, Medicinal	Tin Lined		Tinned
Varnishes—Spirit:			
Grain Alcohol Solvent	Tin Lined		Tinned
Wood Alcohol Solvent	Tin Lined		Tinned
Denatured Alcohol Solvent	Tin Lined		Tinned
Petroleum Spirit Solvent	Galvanized		Standard
Acetone Solvent	Galvanized		Standard
Varnishes—Turpentine	Galvanized		Brass Parts Tinned and Galvanized
Varnishes—Linseed Oil	Galvanized		Standard

Non-Volatile Liquids

Requiring Non-Evaporation-Proof Outfits, Such as Cuts Nos. 224, 163, 288, 35, 39, 80, 27, 165, 65, 45, and Type A or S Tanks in Connection with Any Long Distance Pump

Liquid	Tank	Steam Coil	Pump
Absorption Oil	Black or Galvanized		Standard
Aeroplane Oil	Black or Galvanized		Standard
Air Compressor Oil	Black or Galvanized		Standard
Albolene Liquid	Black or Galvanized		Standard
Amalie	Black or Galvanized		Standard
Amber Rubbing Oil	Black or Galvanized		Standard
Ammonia Oil	Black or Galvanized		Standard
Anthracene	Black	Yes	Tinned (or Brass Parts Tinned & Black)
Asphaltum	Black or Galvanized	?	Standard
Atoleine	Black or Galvanized		Standard
Atolin	Black or Galvanized		Standard
Batching Oil	Black or Galvanized		Standard
Bessemer Oil	Black or Galvanized		Standard
Black Fish Oil	Black or Galvanized		Standard
Black Oil—Summer	Black or Galvanized	Yes	Standard—Back Gear
Black Oil—Winter	Black or Galvanized	?	Standard
Blown Oil—Mineral	Black or Galvanized	Yes	Standard—Back Gear
Bolt Oil	Black or Galvanized		Standard
Brick Oil	Black or Galvanized		Standard
B. S. Oil	Black or Galvanized	Yes	Standard—Back Gear
Buffing Oil	Black or Galvanized		Standard
Burning Oil	Black or Galvanized		Standard
Butter Oil	Black or Galvanized		Standard
Bolt Dressing	Black or Galvanized		Standard
Carbon Oil	Black or Galvanized		Standard
Carbolic Oil—Crude	Black	Yes	Tinned (or Brass Parts Tinned & Black)
Car Oil	Black or Galvanized	?	Standard
Carbolinum	Black or Galvanized		Standard
Castor Machine Oil	Black or Galvanized		Standard
Caustic Soda	Black		Black
Clennola	Black or Galvanized		Standard
Cocoonut Oil	Black or Galvanized	Yes	Standard
Coal Oil	Black or Galvanized		Standard
Cod Liver Oil	Black		Tinned (or Brass Parts Tinned & Black)
Cooking Oil	Black or Galvanized		Standard
Cordage Oil	Black or Galvanized	?	Standard
Core Oil	Black or Galvanized		Standard
Cotton Seed Oil	Black or Galvanized	Yes	Standard (but no tin)

Liquid	Tank	Steam Coil	Pump
Compressor Oil	Black or Galvanized		Standard
Concrete Form Oil	Black or Galvanized		Standard
Condensed Oil	Black or Galvanized		Standard
Crank Case Oil	Black or Galvanized		Standard
Cream Separator Oil	Black or Galvanized		Standard
Creoline	Black		Tinned (or Brass Parts Tinned & Black)
Creosote	Black	?	Tinned (or Brass Parts Tinned & Black)
Crusher Oil	Black or Galvanized	?	Standard—Back Gear
Crude Petroleum	Black or Galvanized		Standard
Crysmalin	Black or Galvanized	Yes	Standard
Curve Grease	Black or Galvanized	?	Standard—Back Gear
Cutting Oil	Black or Galvanized	Yes	Standard
Cylinder Oil—Steam	Black or Galvanized		Standard
Cylinder Stock	Black or Galvanized	Yes	Standard—Back Gear
Dead Oil	Black or Galvanized	Yes	Standard
Deeline	Black or Galvanized		Standard
Die Oil	Black or Galvanized		Standard
Distillate	Black or Galvanized	?	Standard
Dolphin Oil	Black or Galvanized		Standard
Drivers Oil	Black or Galvanized		Standard
Dynamo Oil	Black or Galvanized		Standard
Emulsicool	Black or Galvanized	?	Standard
Engine Oil	Black or Galvanized		Standard
Engine Distillate	Black or Galvanized		Standard
Export Oil	Black or Galvanized		Standard
Floor Oil	Black or Galvanized		Standard
Flux Oil	Black or Galvanized	Yes	Standard—Back Gear
Foam Oil	Black or Galvanized		Standard
Form Oil	Black or Galvanized		Standard
Fuel Oil	Black or Galvanized	Yes	Standard
Gas Fluid	Black or Galvanized		Standard
Gas House Tar	Black	Yes	Tinned (or Brass Parts Tinned & Black)
Gas Oil	Black or Galvanized		Standard
Gear Case Oil	Black or Galvanized	?	Standard—Back Gear
Glaton Oil	Black or Galvanized		Standard
Glycerine	Galvanized		Standard
Glycolin	Black or Galvanized		Standard
Glyco	Black or Galvanized		Standard
Hammer Oil	Black or Galvanized	Yes	Standard—Back Gear
Harness Oil	Black or Galvanized		Standard
Harvester Oil	Black or Galvanized		Standard
Head Light Oil	Black or Galvanized		Standard
Ice Machine Oil	Black or Galvanized		Standard
Insect Oil	Black or Galvanized		Standard
Interol	Black or Galvanized		Standard
Incubator Oil	Black or Galvanized		Standard
Illuminating Oil	Black or Galvanized		Standard
Journal Oil	Black or Galvanized	Yes	Standard—Back Gear
Kerosene	Black or Galvanized		Standard
Knitting Machine Oil	Black or Galvanized		Standard
Lamp Oil	Black or Galvanized		Standard
Lard Oil	Black	Yes	Tinned (or Brass Parts Tinned & Black)
Leather Oil—Mineral	Black or Galvanized		Standard
Liberty Motor Oil—Heavy	Black or Galvanized		Standard
Liberty Motor Oil—Light	Black or Galvanized		Standard
Light House Oil	Black or Galvanized		Standard
Light Slushing Oil	Black or Galvanized		Standard
Liquid Petrolatum	Black or Galvanized		Standard
Loom Oil	Black or Galvanized		Standard
Machine Oil	Black or Galvanized		Standard
Machine Gun Oil	Black or Galvanized		Standard
Marine Oil	Black or Galvanized		Standard
Med-o-line	Black or Galvanized		Standard
Meter Oil	Black or Galvanized		Standard
Miners Oil	Black or Galvanized		Standard
Min-Seed Oil	Black or Galvanized		Standard
Mineral Lard Oil	Black or Galvanized	Yes	Standard Back Gear
Mineral Sperm	Black or Galvanized		Standard
Mineral Colza	Black or Galvanized		Standard
Mine Machine Oil	Black or Galvanized		Standard
Motorcycle Oil	Black or Galvanized		Standard
Motor Oil—Mobile "B"	Black or Galvanized		Standard Back Gear
Motor Oil—Extra Heavy	Black or Galvanized		Standard
Motor Oil—Heavy	Black or Galvanized		Standard
Motor Oil—Medium	Black or Galvanized		Standard
Motor Oil—Light	Black or Galvanized		Standard
Motor Oil—Extra Light	Black or Galvanized		Standard
Mosquito Oil	Black or Galvanized		Standard
Motor Spirits	Black or Galvanized		Standard
Mould Oil	Black or Galvanized		Standard

Non-Volatile Liquids—Continued

Liquid	Tank	Steam Coil	Pump
Neatsfoot Oil	Galvanized		Brass Part Tinned and Galvanized
Non-Viscons Neutral	Black or Galvanized		Standard
Nujol	Black or Galvanized		Standard
Oilclag	Black or Galvanized		Standard
Oil of Paraffin	Black or Galvanized		Standard
Orchard Oil	Black or Galvanized		Standard
Paint—Mineral	Black or Galvanized		Standard
Paint Oil—Mineral	Black or Galvanized		Standard
Paraffin Oil	Black or Galvanized		Standard
Petrolatum	Black or Galvanized	Yes	Standard—Back Gear
Petrolatum—Liquid	Black or Galvanized		Standard
Photogene	Black or Galvanized		Standard
Petrolatum Oil	Black or Galvanized		Standard
Petro	Black or Galvanized		Standard
Petralol	Black or Galvanized		Standard
Pit Car Oil	Black or Galvanized		Standard
Porpoise Oil	Black or Galvanized		Standard
Pneumatic Oil	Black or Galvanized		Standard
Polishing Oil	Black or Galvanized		Standard
Putty Oil	Black or Galvanized		Standard
Quenching Oil	Black or Galvanized	Yes	Standard
Reduced Oil	Black or Galvanized	Yes	Standard
Repress Oil	Black or Galvanized		Standard
Road Oil	Black or Galvanized	?	Standard
Rosin Oil—Adulterant	Black or Galvanized		Standard
Rosin Oil	Black or Galvanized		Standard
Rubbing Oil	Black or Galvanized		Standard
Russian Oil	Black or Galvanized		Standard
Roll Oil	Black or Galvanized		Standard
Saw Oil	Black or Galvanized		Standard
Saturating Oil	Black or Galvanized		Standard
Screw Cutting Oil	Black or Galvanized	?	Standard
Sewing Machine Oil	Black or Galvanized		Standard
Seasame Oil	Black		All Black or Brass
Shale Oil—Crude	Black or Galvanized		Standard
600 W	Black or Galvanized	Yes	Standard—Back Gear
Shafting Oil	Black or Galvanized		Standard
Signal Oil (No Lard)	Black or Galvanized		Standard
Signal Oil (Containing Lard)	Black	?	Tinned (or Brass Parts Tinned & Black)
Slide Oil	Black or Galvanized		Standard—Back Gear
Smudge Oil	Black or Galvanized		Standard
Slushing Oil	Black or Galvanized	Yes	Standard—Back Gear
Soluble Oil	Black or Galvanized		Standard
Spindle Oil	Black or Galvanized		Standard
Stitching Oil	Black or Galvanized		Standard
Straw Oil	Black or Galvanized		Standard
Stainless Oil	Tin Lined		Tinned
Summer Black Oil	Black or Galvanized	Yes	Standard—Back Gear
Tar Distillate	Black or Galvanized		Standard
Tallow Oil	Black or Galvanized	Yes	Standard
Tar Oil	Black or Galvanized	Yes	Standard
Tempering Oil	Black or Galvanized	?	Standard
Transit Oil	Black or Galvanized		Standard
Thread Cutting Oil	Black or Galvanized	?	Standard
Torch Oil	Black or Galvanized		Standard
Transformer Oil	Black or Galvanized		Standard
Transmission Oil	Black or Galvanized	?	Standard—Back Gear
300 Burning Oil	Black or Galvanized		Standard
Turbine Oil	Black or Galvanized		Standard
Unfiltered Stocks—Cylinder	Black or Galvanized	Yes	Standard—Back Gear
Valve Oil	Black or Galvanized	?	Standard
Viscons Neutral	Black or Galvanized		Standard
Watch Oil	Black or Galvanized		Standard
White Oil	Black or Galvanized		Standard
Winter Oil	Black or Galvanized		Standard
Wool Stocks	Black or Galvanized		Standard
Worm Gear Oil	Black or Galvanized	?	Standard—Back Gear

NOTES: Before writing equipment order for liquid listed above, read the following notes carefully. Special prices for equipment to handle liquids not listed will be for special operations for which prices are not published, must be secured from the Home Office in each individual case.

1. Where rates indicated below are considered special in that such equipment is not stocked and delivery must be expected accordingly, as well as are additional charges not.

TANKS

1. We will be advised regarding location of tanks where steam coils are listed or questioned, as they may sometimes be omitted.
2. Where tanks only can be used and equipment is not sunk in black metal, a special price must be secured.
3. Where note "Tin Lined (or Black)" is made, charge for tinning where a published price for this is given—otherwise consult Home Office.

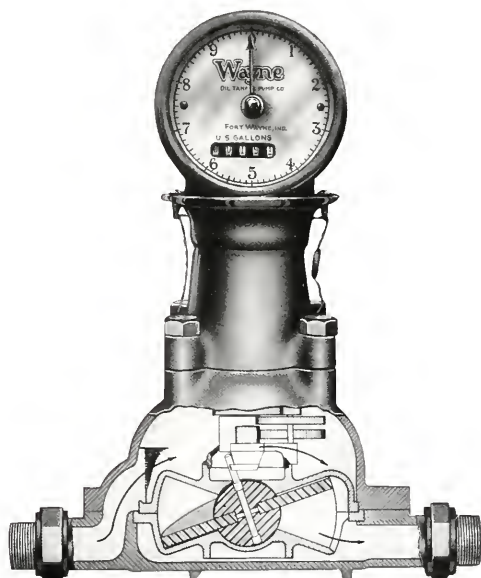
PUMPS

1. Where note "Brass Parts Tinned and Galvanized" is made, the pump will be standard with exception that brass parts will be tinned. The note simply implies that no brass or black iron shall come in contact with the liquid.
2. Where note "Tinned (or Brass Parts Tinned and Black)" is made, the same additional charge applies in either case. Note simply implies that no brass or galvanizing shall come in contact with the liquid.
3. Where note "Black or Brass" is made, both operations or a combination of them are specified and it is implied that no galvanizing or tin shall come in contact with the liquid. In some cases standard pumps can be used by simply leaving parts ordinarily galvanized in a plain or black condition. The Home Office should be consulted where this note is made.
4. Where note "Black" is made, consult Home Office. "Black" as referred to in this and other notes does not mean painting—it means plain, uncoated (with another metal) from.



Flow Registering Meters

BULLETIN No. 314



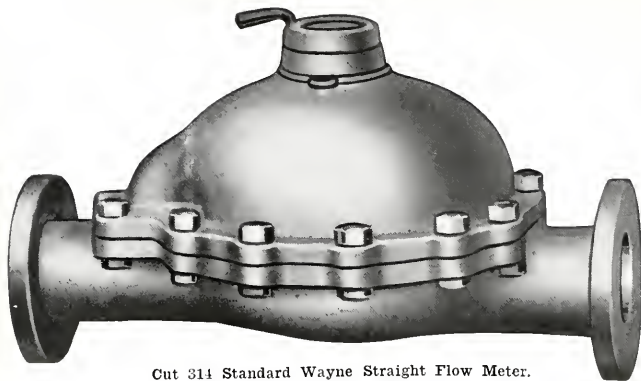
WAYNE CUT NO. 316.
Flow Meter With Ten Gallon Set Dial.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating



Cut 314 Standard Wayne Straight Flow Meter.

General Description: Wayne Flow Registering Meters are especially designed and constructed to measure and accurately record in gallons the quantity of liquid flowing through the pipe line in which they are installed.

They are suitable for measuring oil, gasoline, naphtha and similar liquids.

Where a regulated flow of liquid is maintained from a source of supply to a point of discharge as is required for burners under boilers, furnaces and ovens or from a gravity supply tank to mixing vats or tank wagons, an accurate check on consumption or discharge is recorded.

The total consumption is indicated on the totalling meter, which records on a straight reading dial every gallon passed through the meter, while the rate of flow can be checked on the large dial which indicates the passage of the liquid through the meter in pints, quarts and gallons up to ten.

In lines to burners and similar systems care should be taken in selecting a meter that the minimum flow of oil is not less than the rated minimum flow of the meter.

In all installations where the pressure is to be generated by a gravity feed it is advisable that a fall or head of not less than ten feet be maintained in order to insure sufficient pressure for accurate operation of the meter.

Operation: The fluid enters the inlet shown on the left side of the sectional view, first passing through the strainer, and then upward to the top of the main casing. It then passes downward through the measuring chamber where it operates an oscillating disc the spindle of which is connected to

the totalling register through a train of gears. The oscillations of the disc displace a definite quantity of fluid for each revolution at speeds proportional to the flow of the fluid. The design of the measuring chamber and disc in Wayne Flow Registering Meters allows the passage of exact quantities, thus insuring unusual accuracy. After the measuring operation is performed the oil or fluid passes out through the meter outlet at the base of the meter. The flow of the fluid is not impeded by the operation of the measuring mechanism, being even and continuous while the meter is operating.

Construction Materials: The metering mechanism is made of hard brass, bronze, German silver and aluminum according to the purpose of the part and its use in the complete mechanism. The outside casing is of high grade brass or galvanized iron and casing is tested to a pressure of 300 pounds per square inch. The fluids for which this meter is planned to measure have no injurious or destructive effect on the mechanism.

Interchangeable Parts: Any part that may be damaged or worn can be replaced without difficulty and at small cost.

Jeweled Bearings: The largest gears on Wayne Flow Registering Meter revolve on a phosphor bronze pivot the ends of these pivots being jeweled. This prevents dirt from entering and cutting the gear bearing, and allows the gear to revolve with the greatest ease and the least wear.

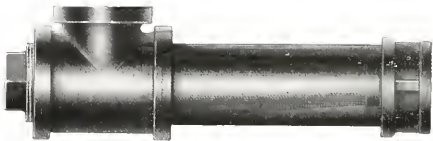
Straight Reading Totalling Register: This is placed in the face of the large dial on the vertical type, and prominently placed in the horizontal type, and registers quantities up to 100,000 or 1,000,000 gallons according to the size of the meter. The figures are placed in regular numerical order and can be read at a glance.

For test or regulating purposes, or for the delivery of minor quantities as at a gasoline service station, a large dial divided into pints, quarts and gallons is provided. A knurled handle which extends beyond the glass that covers the dial allows the pointer to be turned back to zero whenever desired.

A pipe line strainer should be placed in all pipe lines in order to remove all foreign matter from the liquid which would be injurious to the meter or pump.

By removing the plug in the end of the strainer the conical screen can be easily removed for cleaning.

The Cut 118 Strainer is made standard for 1", 1½", 2", 3" and 4" pipe connections.



Cut 118 Wayne Pipe Line Strainer.

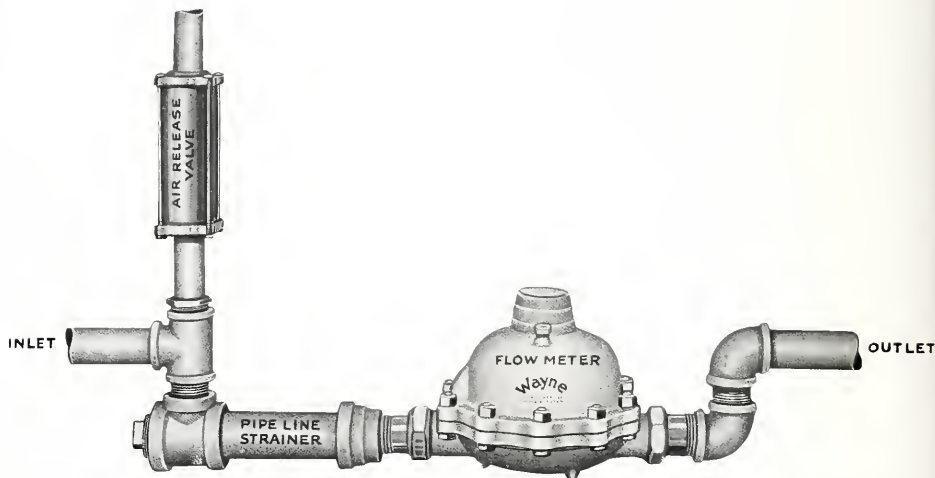
Specifications of Wayne Flow Registering Meters

Size of Meter	*Capacity for Continuous Rates of Flow per Hour U. S. Gallons		‡Size of Pipe Connections	§Minimum Pressure Under Which Meter will Operate Lbs. per Sq. in.	Approximate U. S. Gallons passed per minute at different pressures varying on the viscosity of the oil measured.				
	Minimum	Maximum			At 2-lbs.	At 5-lbs.	At 10-lbs.	At 15-lbs.	At 20-lbs.
1	6	300	1½-in.	1	3	5	7	9	10
2	10	500	1½-in.	1	5	7	10	13	15
3	30	1000	3¼-in.	1	9	13	18	23	27
4	60	2000	1 -in.	1	13	20	29	35	40
5	90	3000	1¼-in.	2	20	30	43	52	60
6	120	4000	1½-in.	2	26	40	57	70	80
7	175	6000	1½-in.	3	34	55	77	95	108
8	250	9000	2 -in.	3	57	90	128	156	180
9	250	9000	2½-in.	3	70	112	158	196	225
			3 -in. Flange	3					

*These minimum quantities are the smallest rates of flow which the meters should be expected to measure accurately. The maximum quantities are the highest rates of flow for continuous operation without undue wear. Meters used only occasionally may be safely operated on flows twice the maximum quantities.

‡The size of meter required is not determined by the size of pipe on which it is to be set, but by the flow to be measured.

§The pressure may be supplied by pump, gravity or air pressure. The meters will work on any pressure above the minimum for their respective sizes.



This cut illustrates the correct installation of the Air Relief Valve, Pipe Line Strainer and Meter.

The meter must be placed in the discharge pipe of the pump and trapped as shown in the cut by being dropped below the line of flow of the pipe line.

The air relief valve may be placed on either side of the strainer but must be placed at the highest point of pipe line in order to permit the escape of air which will be recorded by the meter if pumped through it.

Data Required for the Selection of the Proper Meter.

- 1—Into what size discharge pipe is the meter to be installed?
- 2—Is the pressure secured by gravity flow or pump?
- 3—If pump is used, what will be the minimum pressure? What will be the maximum pressure?
- 4—What type of pump will be used—rotary, single action piston, double action piston, or triplex plunger type pump?
- 5—What liquid will be used? If possible, state the specific gravity.
- 6—If pressure is secured by gravity flow, what will be the vertical distance from the source of supply to the meter?
- 7—What will be the approximate flow in gallons per minute?
- 8—Give cold test of oil if known.



Sidewalk Pump for Lubricating Oils

BULLETIN No. 320

This up-to-date outfit is especially adapted for use in storing and measuring lubricating oils at the curb. It is constructed dust and dirt proof. Clean oil means smoother running machinery. Dirty oil shortens the life of bearings and a WAYNE system such as illustrated here entirely eliminates dirt.



CUT No. 320

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

CURB PUMP FOR HANDLING LUBRICATING OILS**General Description**

This pump is the long distance type. The storage tank is buried underground in any convenient location and at any reasonable distance from the pump. The pump and tank are connected by a 1¼" pipe line, allowing a free and rapid flow of oil. This pump is especially designed for sidewalk installation, but may be used inside if desired. The cabinet or housing is made of cast iron and sheet steel, thoroughly protecting the working parts from the elements. The base and dome are heavy cast iron. The pedestal and the telescoping housing are made from sheet steel. The dome is supported by two 1¼" galvanized pipes, making the pump absolutely rigid and permanent. The housing fits in a special groove at the lower edge of the dome, making this the only positively waterproof outfit on the market. This pump is held in place by four expansion bolts driven through the base. It is finished in olive green, lettered in gold. The cabinet presents a striking appearance and serves as an advertisement. It is fitted with a discharge terminating in an anti-drip nozzle. It discharges half pints, pints and quarts at a stroke. The measuring cylinder, plunger rod, stuffing box, valves, etc., are made of solid brass.

Housing: This pump is provided with a circular housing which telescopes the pedestal of the pump when it is opened. The housing is operated by means of chains and counter-weights. These counter-weights operate inside of the supporting columns to the dome and the chains are run over roller bearing pulleys, making the pump operate much like a weighted window. There is a distinct advantage in this construction, as the pump occupies no more room when it is open than it does when it is closed. In addition to this the housing and pedestal are made of sheet steel, thus avoiding the breakage which is liable to occur on pumps constructed of cast iron. This housing is provided with a special Yale lock which snaps shut when the housing is pushed up. Handles are provided on the side of the housing to permit the operator to raise and lower it with ease.

Valves: The suction line is 1¼" and is provided with a set of double brass valves in the tank. The accuracy of any measuring pump depends primarily upon its valves. In purchasing this point should be thoroughly investigated. These valves in the Wayne system are made entirely of brass. The poppet and seat are carefully machined and then hand ground. The body in which these valves are set is solid brass. Each valve works independently of the other. After this care in construction all valves are tested under air pressure to eliminate any possibility of leaks; then they are subjected to a twenty-four-hour gasoline test. The brass used in Wayne Valves is always of the same consistency, as these brass castings are made over a set formula.

Discharge: This outfit is equipped with a ¾" non-drip Type D nozzle for use in filling bottles or small-necked containers. This non-drip nozzle prevents any flow of liquid after pumping ceases. Quantity stops are arranged in the head of the pump, clear and away from the liquid. These stops regulate the accurate measurement of half pints, pints and quarts. Adjusting devices are easily accessible; these are also located at the pump head. An automatic tripping device instantly releases any stop which has been previously set.

Space Required: This device measures approximately 15 inches in diameter and 54 inches in height.

Equipment: The standard equipment includes the following: Pump, one-way discharge, Type D nozzle, ribbed bottomed measure receptacle, foot valves, suction pipe for tank with union. (Pipe from union to pump not included.) A quart meter can be supplied for this pump at a slight additional cost. This pump will not be furnished back-gear.

A Model Installation: The illustration at the right gives an excellent idea of a model installation at the curb. Pump is located conveniently at the curb and carefully secured by lag screws. The tank is buried underground at any desirable distance from the pump. The standard depth of burial is three feet below the surface—thus placing contents of the tank below the frost line and eliminating a wide variance in temperature and preventing freezing of oil.





Storage Systems for Oils and Gasoline

BULLETIN No. 322



Cut No. 322

This long-distance outfit is admirably adapted for the private garage. Where a large capacity pump is not desired, it will meet the requirements in a most efficient manner. It is not expensive and affords you an opportunity to install one of the latest improved gasoline storage systems.

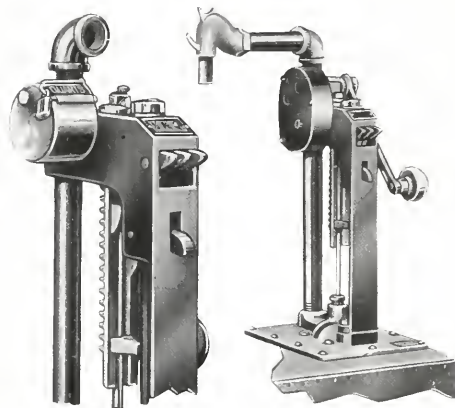
Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

General Description Cut 322



Cut 322 Pump Head, showing quart meter attached. This meter is supplied at extra cost.

Cut 322 Pump Head, showing back gearing for handling heavy oils such as 600 W., etc.

Pump: This pump is the long-distance type. That means the pump can be set in the building wherever desired, and the underground storage tank, to which it is connected, may be buried in the ground outside, usually where it is the most convenient for filling. The pump is supplied with a lock. This outfit is constructed of especially selected materials throughout, and erected by skilled workmen. Every pump is thoroughly tested for soundness of construction and accuracy of measurement. They are guaranteed to be free from imperfections in either material or workmanship. The measuring cylinder is made of seamless brass tubing. The plunger rod, stuffing box, valves, nozzle, etc., are made of brass. The method of construction insures strength and durability. This pump measures a quart, pint or half-pint at a stroke. It may be fitted with a special gasoline hose and filling nozzle, which are especially advantageous in filling automobiles. Where the hose is furnished, a two-way discharge is necessary.

Valves: Suction line is provided with a set of double brass valves. The accuracy in measuring depends primarily upon these valves. In purchasing, this point should be thoroughly investigated. Too much stress cannot be laid upon their construction and arrangement. These valves in the Wayne Systems are made entirely of brass. The poppet and seat are carefully machined and ground. The heavy body in which these valves are set is solid brass. Each valve works independently of the other. After this care in construction all valves are tested under pressure to eliminate the possibility of leaks.

Discharge Pipe: The discharge pipe, which is $\frac{3}{4}$ inch, terminates in a lever shut-off nozzle, making it evaporation-proof.

Space Required: This pump occupies approximately $1\frac{1}{2}$ square feet of floor space. The amount of space required depends somewhat on the location of the pump in the building. The pump stands about four feet high.

Special Notice: This pump will handle straight run gasoline testing not more than 68 degrees and blended gasoline testing not more than 64 degrees. If higher test is handled consult the factory.

Tanks: The type of tanks most commonly sold in connection with Cut 322 pump are those commonly called light metal. These may be of fourteen or twelve gauge galvanized steel. They are carefully made, tested and fully guaranteed for two years. An actual scale showing comparative thickness of metal is shown below.

Dimensions: *Standard tanks are made in the following sizes:

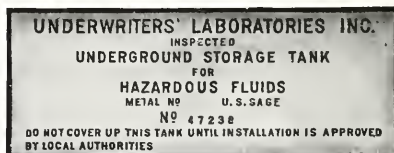
Capacity Bbls.	Capacity Gallons	Diameter Inches	Length Inches
1	63	27	30
2	120	31	42
5	280	38	61
9	500	38	107
10	550	38	118

Equipment: The standard tank equipment includes the following: Tank, Gauge Stick for Tank, Fill Pipe complete, Suction Pipe for Tank with Union (pipe from union to pump not included).

*The standard fill pipe is 30 inches high from top of tank. To find the depth of the excavation necessary to bury the tank, add diameter of tank to length of fill pipe, allowing about six inches of the fill pipe to extend above ground.

GAUGE	ACTUAL THICKNESS	PART OF IN.
NO 14		5/64
NO 12		7/64

Showing Actual Thickness of Light Metal Storage Tanks.



Wayne Tanks for Volatile Liquids Bear This Label.

REG. U. S.
Wayne
TRADE MARK

AGITATORS

BULLETIN No. 328



Cut 328 Power Agitator on Type V Tank

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

Wayne Agitators

For the proper storage of certain liquids, it is necessary to equip the tanks with agitators so that the liquids may be re-mixed before distribution. Agitators are also used for the original compounding or blending of liquids.

Agitators are operated by hand and power, depending on the volume and consistency of the liquid to be mixed.

Construction

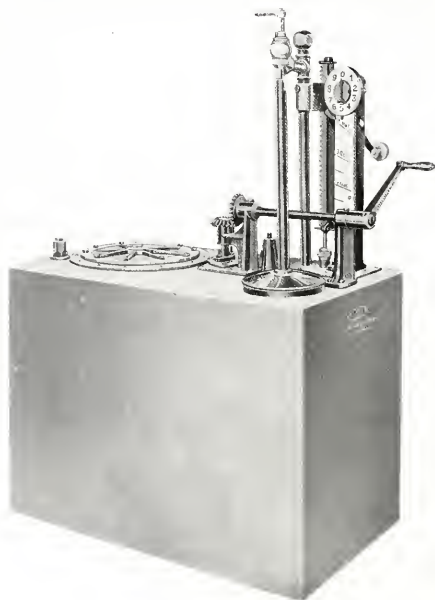
CONSTRUCTION. Wayne Agitators are designed and constructed for light or heavy liquids and for large and small tanks. Some liquids require heavier blades than others.

The proper construction of an agitator, however,

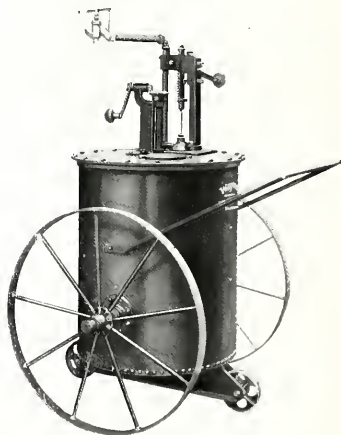
in many cases requires baffle plates riveted to the inside shell of the tank so that the blades throw the liquid against the baffle. Other outfits are built with steam coils behind the baffle plates and between the blades, so that the consistency of the liquids may be reduced. In many cases it is necessary to tin line the agitator tanks and in such event the agitator itself must be tin plated.

Please note the last page of this bulletin. These questions should be answered in full to insure the proper type of Agitator for the work to be done.

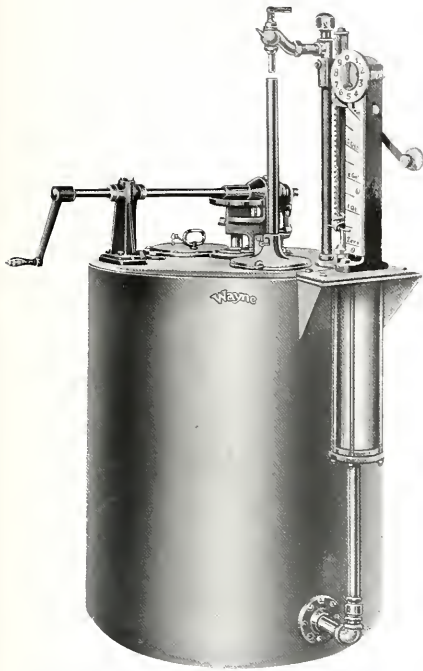
The foregoing cut shows the installation of a Cut 327 Hand Agitator in a Cut 71 Battery Outfit. You will note that the Agitator is so designed that it will not interfere with barrel track or barrel. This outfit is often used for stains and other liquids common to the paint industry.



Cut 71 With Hand Agitator.



The above is an illustration of the Cut 327 Agitator supplied with a Cut 231 Rubber Cement Outfit, the purpose of the agitator being to overcome the separation of the solvent or to mix additional solvent.

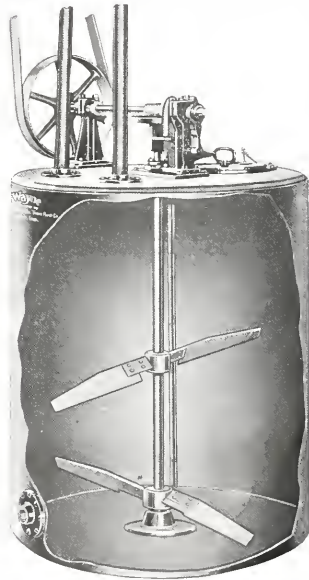


The above illustration shows a Cut 327 Hand Agitator mounted on a type V tank, in connection with a Cut 360 gallon pump. This combination is possibly the best when individual units instead of battery outfits are required. It is also easier to get a good mixture in a cylindrical tank than in a rectangular tank. The agitator blades can reach all points of the liquid without interference and the pump cylinder, when placed outside of the tank on a bracket, in no way shortens the agitator blades.

The Type V tank and agitator is often used without a pump for the mixing of soluble oil and water for cutting compound, the tank being elevated from the floor and the compound being drawn from a valve mounted on the suction flange.

POWER AGITATORS. On tanks of five barrels capacity or larger, and for very heavy compounds, it is desirable to use a power driven Agitator.

The Cut 328 Power Agitator is shown below and on the cover of this bulletin in a Type V tank. You will note that the four baffle plates are riveted to the shell of the tank. These baffles just clear the Agitator blades and tend to give a counter flow to the liquid so that a better mixture is secured. If it is desired to have several tanks in a battery, one Agitator Drive Shaft is used and each agitator is equipped with a clutch so that any one or all may be driven by the same power. The shaft driving the agitator on a single outfit may be equipped with a clutch or with tight and loose pulley, as desired. The single pulley and clutch are recommended if there is a possibility of adding more units in the future.



Suggested Uses for Agitators

Blending varnishes
Mixing enamels and reducers
Rubber cement
Soluble oil and water
Shellacs
Stains which separate
Mixing cutting oil
Wool oil emulsions
Paints and thinners
Blending of oils

Information Required

1. What liquids are to be mixed?
2. If not well known, send samples.
3. What temperature is necessary to secure a good mixture?
4. In what quantities will liquids be distributed or used?
5. Will liquids be pumped to Agitator Tank?
6. Will liquids evaporate?
7. Will future agitator tanks be placed in same battery?
8. What quantity of batch is it desired to mix at one time?



Indicators and Gauges

For Lubricating, Fuel and Paint Oils, Kerosene, Etc.

BULLETIN No. 330



The 336 Wall Indicator is designed for use on oil-house installations where the tanks are placed in basement, vaults, or underground. Indicators placed in convenient position on floor above.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

Wayne Wall Indicators in connection with Wayne Storage tanks will enable you to tell at a glance the amount of oil on hand, without the necessity of opening the tank.

They consist of a gauge board, set in convenient place, finished in white enamel and properly graduated in large, plain, black figures, and a marker that travels up and down, controlled by a float in the tank, connected by wire cable and shieves.

They can be used in connection with both above and below ground tanks, either square, round or cone bottom. They will enable you to determine approximately how much oil can be put in the tank, how much has been taken out, and will be found very convenient for monthly invoicing.

They are liberally proportioned and are built strong. There is nothing about them

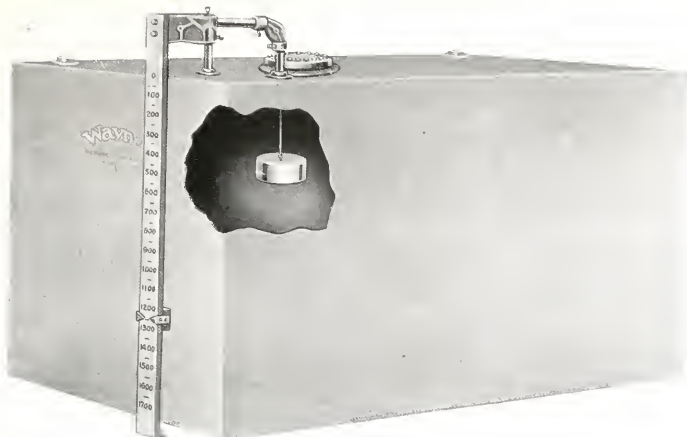
to wear out, catch or break, and they will give years of satisfactory service and can be relied upon at all times.

Wayne Indicators are Carefully Graduated and built to indicate the contents of the tank they are intended for. While they do not indicate the exact contents of a tank to the gallon, they are as correct as engineering skill and experience can make any float indicator.

While Wayne Indicators can be adapted to almost any size and shape of tank, it is impractical to furnish them for tanks not manufactured by us, unless careful measurement can be made of the inside (not the outside) of the tank. In the larger size tanks one half-inch variation in size will sometimes cause the gauge to be incorrect as much as fifty gallons.



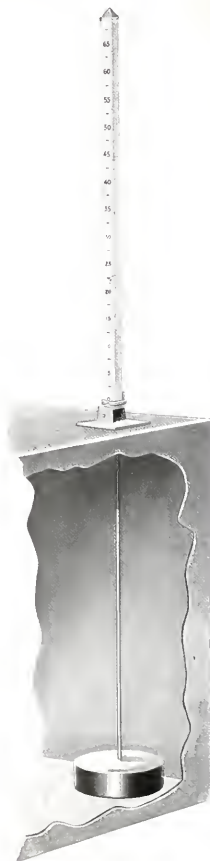
Showing 5 Cut 336 Indicator Boards as Installed

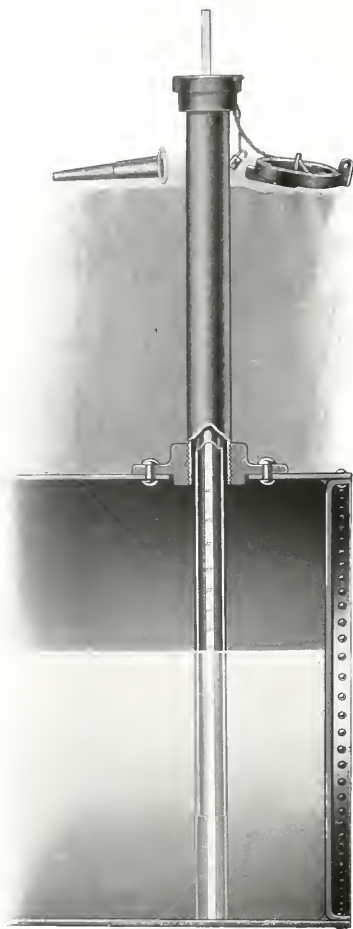


The 332 Basement Indicator where tanks are in basement, oil vault or at some distance from oil-house, arranged to bolt directly on side of rectangular tank or on side or end of cylindrical tank.

The Cut 330 Float Indicator can be adapted to rectangular, cylindrical or cone bottom tanks when used for non-volatile liquids. It is the simplest form of float indicator manufactured.

This indicator requires overhead room equal to the depth of the tank so that the marker can travel up and down the stationary graduated stick.





The Cut 334 Dip Gauge is furnished as standard, without additional cost, with all Wayne underground storage tanks. Made of hard wood, marked in five gallon graduations. It will tell approximately how much liquid is in the tank.

While it is always possible to provide a new dip gauge for tanks we have furnished, should the original one become lost or destroyed, it is impractical to furnish a gauge that will correctly record contents of tanks which we have no record of.

Our Engineering Department will be glad to assist in planning the most economical way to solve your oil storage problems. Our twenty-eight years of experience will be of service to you and there will be no obligation on your part.

See Bulletin 89 for data on Rectangular Tanks.

See Bulletin 79-88 for data on Cylindrical Tanks.

See Bulletin 218 for data on Counter Balance Pump.

See Bulletin 268 for data on High Lift Pump.

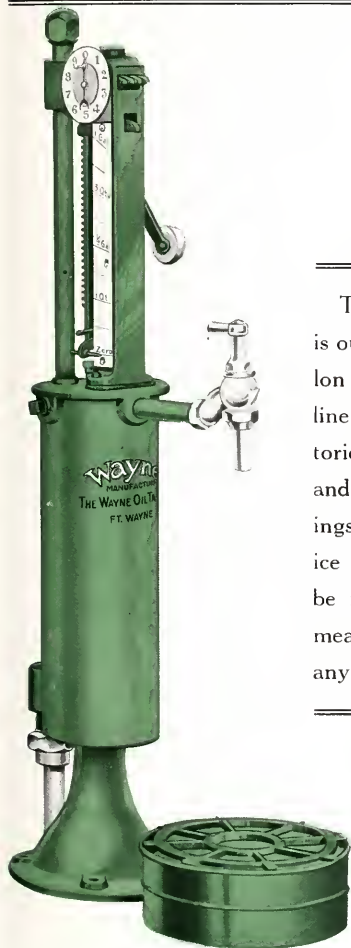
See Bulletins 364, 322 and 278 for data on First Floor Pumps.

See Bulletins 35 and 65 for data on small Lubricating Storage Tanks.



Long Distance One Gallon Four Measure Gasoline and Oil Pump

BULLETIN No. 364



For Oils.

This long distance pump is our most efficient one-gallon pump for handling gasoline and oil in garages, factories, shops, mills, railroads and stores or other buildings. It will give good service for many years and can be installed to handle and measure liquids under most any condition.



For Gasoline.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

General Description of Standard Cut 364 Pump

This pump, shown on the front page, is our standard one-gallon long distance pump, most commonly used for handling and measuring gasoline and oils inside buildings, such as stores, garages, factories, mills, mines, railroad shops and private garages. It measures pints, quarts, half-gallons and gallons. The pump is made of the very finest materials fashioned by experienced mechanics. All castings are carefully selected, machined and fitted. Every part of the pump coming in contact with the liquid is galvanized or made of brass to prevent any possibility of rust. This is a safeguard found only in Wayne pumps. The measuring cylinder is made from seamless brass tubing. This lessens the possibility of leakage along the seam. The adjustments regulating the flow of liquid from the pump are placed at the head of the pump. These are push levers and very easily and quickly operated.

Valves: The valves of any measuring device are the most important feature. If these are poorly made of inferior material and not properly fitted they will cause inaccurate measure and an endless amount of trouble. In a Wayne pump each individual poppet valve, such as the one in the plunger, as well as the double foot-valves for the tank, are made of brass. Each is carefully machined to a fit and then individually ground. After machining and grinding they are subjected to a high pressure test for leakage.

Discharge Register: The standard Cut 364 is fitted with a ten-gallon discharge register showing the gallons delivered from the pump. This is aluminum faced and very easily read by customer.

Quantity Scale: A one-gallon quantity scale is supplied with this model. This scale enables operator and customer to see instantly just what fractional part of a gallon has been discharged into the can or container. This prevents any possibility of argument or doubt.

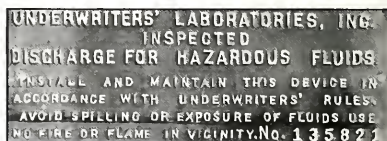
Lock: A tumbler lock is fitted into the pump handle. This enables the operator or owner to guard against unauthorized usage. It prevents theft as well.

Expansion Chamber: At the top of the pump an expansion chamber has been placed which equalizes the pressure of the liquid handled.

Finish: This Cut 364 is finished standard in red enamel, trimmed in gold, and all fittings are nicked. It is a very attractive model. When sold to handle lubricating oils the finish is green with the same lettering and trim as for gasoline. For kerosene the enamel is black.

Speed: This model will deliver a measured gallon of liquid with two and three-quarter turns of the pump handle.

Safety: Cut 364 is built to conform with the rules and regulations of the National Board of Fire Underwriters. It is labeled under their supervision when used for the measuring and handling of volatile liquids such as gasoline, naphtha, etc. It eliminates the use of measures and enables the operator to deliver a measured quantity directly into a can or container.



This is the Underwriters' Label. It is placed on all Wayne pumps used for gasoline or volatile liquids. It is not placed on pumps for lubricating oils.

Standard Equipment: This includes pump, 1½" foot valves, ten-gallon discharge register, quantity scale, lock, suction pipe with union (pipe from pump union to tank union not included). Lag screws for bolting down pump, tank stuffing box, union-ell are included. NOTE—When sold for gasoline usage no drip pan will be provided.

SPECIAL NOTICE—This pump will handle straight run gasoline testing not more than 68 degrees and blended gasoline testing not more than 64 degrees. If higher test gasoline is to be handled consult the factory.

Standard One Gallon Four-Measure Cut 364 Gasoline and Oil Pump Accessories

The following accessories are furnished with this Cut 364 pump at extra cost. While not absolutely necessary to the operation of the pump, they increase its usefulness and convenience.

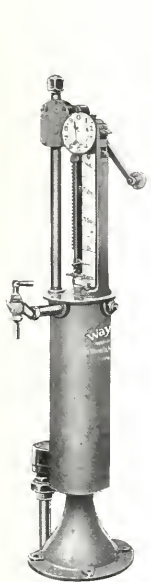
Automatic Hose Draining Valve and Portable Hose, Tube and Hose Hooks. These can be attached to the Cut 364 pump, making it easily possible to discharge the liquid directly into any can or container inside the building or under cover outside a building. The illustration on this page shows the pump fitted with our standard overhead automatic drain valve attachment, gasoline hose, hose tube and hose hooks.

Meter: Our standard one hundred thousand gallon meter may be attached to this pump. It keeps an accurate and complete record of all liquid discharged through the pump. This meter, like all Wayne meters, is a positive gear-driven meter.

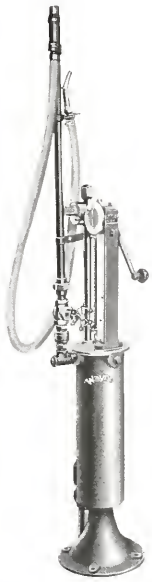
You cannot obtain any liquid through the pump unless a record of the discharge shows on the meter. You can obtain liquid through a pump equipped with a friction driven meter without the record showing on the meter. Note this important point. This meter on a Wayne registers up to one hundred thousand gallons and then automatically repeats. All Wayne meters are sealed and cannot be tampered with. See Bulletin 90 for complete details on Wayne Meters.

Filter: Our standard one-gallon filter may be attached to this model. This filter is a positive one and will separate all impurities as well as water from the liquid. It is very easily and quickly cleaned. See Bulletin 47 for details.

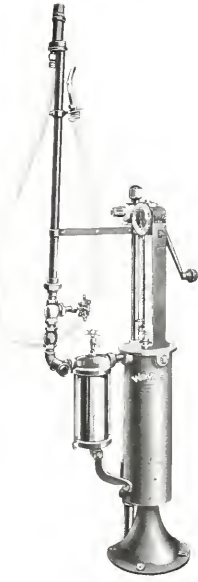
Back Gearing: This feature is provided for on all Wayne Pumps commonly used for handling heavy oils such as 600-W, etc. This is supplied at an extra cost. Back gearing our pumps makes it very easy to draw heavy oils from the tank.



CUT 364
This shows the pump
back geared for heavy
oils.

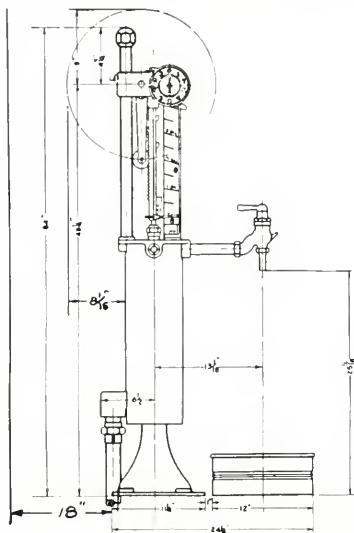


CUT 364
This shows the pump
equipped with Overhead
Drain Valve, Hose, Hose
Tube, Hose Hooks and
Meter. These are extra.



CUT 364
This shows the pump
equipped with Filter,
Overhead Drain Valve,
Hose, Hose Tube, Hose
Hooks and Meter. These
are extra.

General Information Covering Installation and Underground Storage Tanks



Installation plans Showing Distance Pump Should Be Set from Wall, Etc.

Installation Space Required: The illustration above shows how to figure the space required for your installation.

Suction and Discharge Pipe: This Cut 364 is equipped with 1 1/2" suction line. The discharge nozzle is the same on the standard pump as it is on the overhead drain attachment, both being 1".

Pipe Compound: Each pump is supplied with a can of litharge and glycerine (insoluble in gasoline). This should be used in wiping all pipe and pump connections. It sets quickly and is the best safeguard obtainable against leakage in pipe connections.

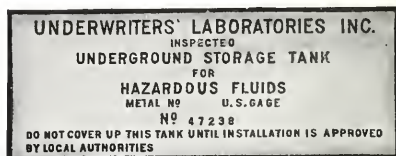
Tanks: The type of tanks most commonly sold in connection with Cut 364 pump are those commonly called light metal. These may be of fourteen or twelve gauge galvanized steel. They are carefully made, tested and fully guaranteed for two years. A cross-sectional view of one of these is shown to the right as well as an actual showing comparative thickness of metal.

Dimensions: *Standard tanks are made in the following sizes:

Capacity Bbls	Capacity Gallons	Diameter Inches	Length Inches
1	63	27	30
2	120	31	42
5	300	38	61
9	500	38	107
10	550	28	118

GAUGE	ACTUAL THICKNESS	Part of In
Nº 14		5/64
Nº 12		7/64

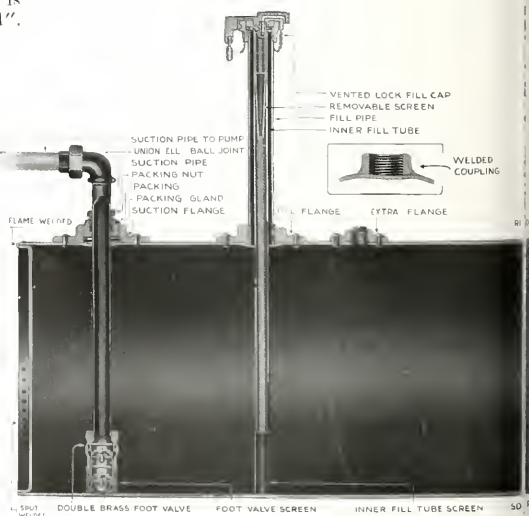
Showing Actual Thickness of Light Metal Storage Tanks.



All Wayne Tanks for Volatile Liquids Bear This Label.

Equipment: The standard tank equipment includes the following: Tank, Gauge Stick for Tank, Fill Pipe complete, Suction Pipe for Tank with Union (pipe from union to pump not included).

*The standard fill pipe is 30 inches high from top of tank. To find the depth of the excavation necessary to bury the tank, add diameter of tank to length of fill pipe, allowing about six inches of the fill pipe to extend above ground.

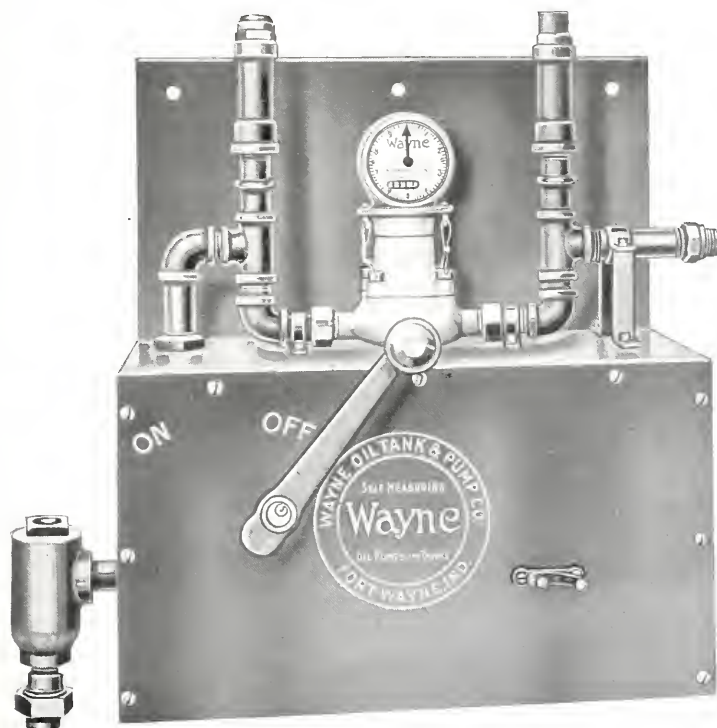


Cross-Sectional View Showing Method of Tank Construction Used.



Remote Control Electric Power Systems

BULLETIN No. 380



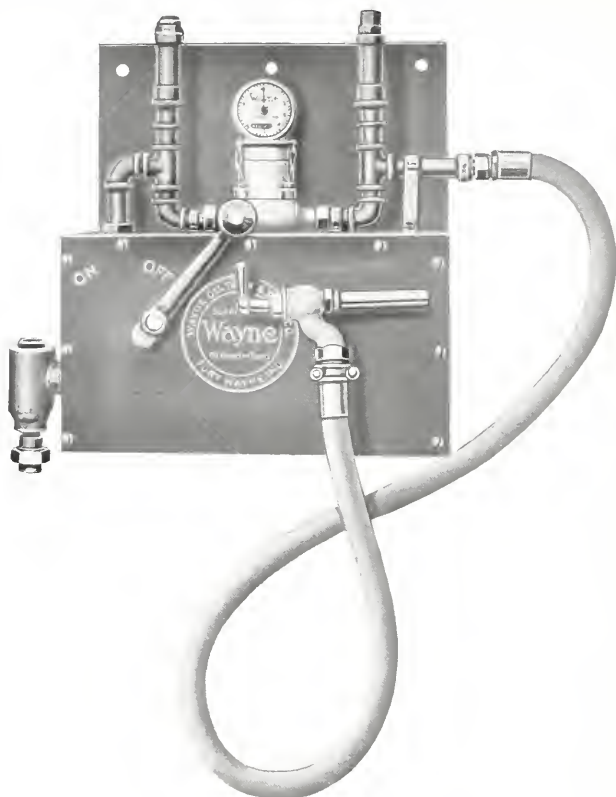
Cut No. 380 Remote Control Panel

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating



Cut No. 382 Remote Control Panel

WAYNE AUTOMATIC REMOTE CONTROL ELECTRIC POWER SYSTEMS

General Description: The Wayne Automatic Electric Power System is designed for the storage, handling and measuring of gasoline, naphthas, lubricating and paint oils, and other non-corrosive liquids.

This system is entirely automatic in its operation and is advantageous in factories or railroad oil houses or garages where it is necessary to draw off liquid several stories above the storage tank or at other distant points where a hand-operated pump cannot be installed or is not practical for the work.

The system is safe, convenient, and clean in its operation. It consists principally of the necessary storage tank or tanks, an electric operated power pump, and one or more draw-off panels. Any number of draw-off panels may be installed and connected to the supply line and operated independently without interfering with the operation of the other panels.

The flow of liquid is controlled by means of a

single lever handle on the draw-off panel. This control lever is attached to both the shut-off valve in the supply line and a quick action electric oil switch mounted inside the panel.

When the control lever on the board is pushed to the left, the valve is opened, and at the same time the electric switch is thrown in. This instantly starts the electric motor driving the supply pump. As the supply line is continuously full, the flow starts immediately upon moving the control lever.

The valve and electric switch are so connected that the rate of flow may be considerably reduced without throwing out the switch.

When sufficient liquid has been drawn, the flow is stopped by moving the control lever to the right. This closes the valve and also opens the electric switch, instantly stopping the motor driving the pump.

The control lever must be held open, as it is connected with a spring which throws the lever when it is released, instantly stopping the flow.

The draw-off panel may also be fitted with an accurate flow meter recording in gallons.

Draw-off Panels: The Draw-off Panels are constructed of heavy, open-hearth steel, attractively finished in red or black enamel. These panels may be attached to a wall or column and connected with the supply pipe. Upon some of these panels is mounted a bronze flow meter, which accurately and continuously records the flow of liquid up to 100,000 gallons. After this amount has been drawn, the meter starts at zero again. This meter is also provided with a large vertical dial, upon which a clock-like hand shows the discharge from 1 to 10 gallons. After drawing any number of gallons, this hand may be set back to zero by simply turning the milled projection on the face of the dial.

This panel is also fitted with an Air Relief Valve, which prevents air passing through the meter, should a tank be pumped dry, a Pipe Line Strainer, and an Overhead Drain Valve, which thoroughly drains the hose after using. A ten-foot length of special oil hose and a portable nozzle are also supplied when specified at extra price.

The control lever is fitted with a heavy Yale lock, which prevents unauthorized tampering with the system.

The shut-off valve in the supply line is of the quick-action packed type, which prevents any danger of a leak.

The Electric Oil Switch on the draw-off panel is of the General Electric make, the knife blades working submerged in an oil bath, thereby avoiding the danger of an electric spark being caused in proximity to inflammable liquids.

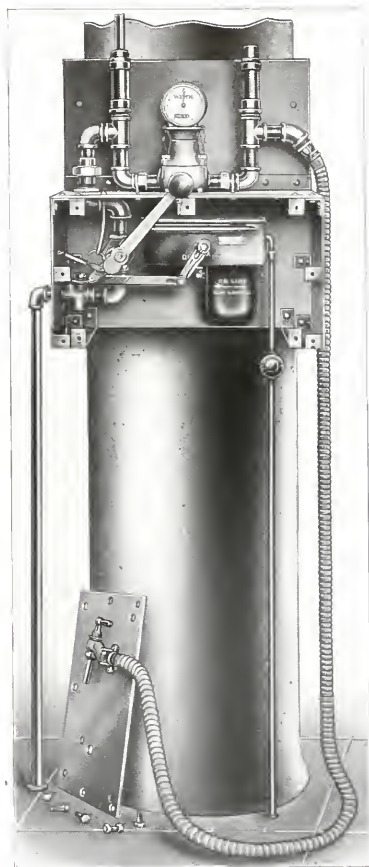
Pump: The Pump used is the standard Cut No. 4010 or Cut No. 4020 Impeller Power Pump. The plunger type pump should only be used when a high pressure is necessary. It is advisable to use the pump, which is direct connected to an electric motor. The belt driven pump should only be used when it is impossible to place the electric motor on the same level with the pump.

The pump should always be placed on a level not more than twelve (12) feet above the level of the bottom of the tank.

The pump is fitted with an Air Chamber, which maintains a steady, even flow at the discharge points, and a by-pass with Relief Valve which is always one pipe size larger than the suction and discharge pipes. This Relief Valve prevents the danger of unnecessary pressure on the discharge line, should the outlet be closed and the pump continue to run. It also insures an even pressure at all the discharge points, whether one or half a dozen draw-off points are open at one time.

If direct current is used, the motor is totally enclosed, thereby avoiding any danger of fire from an electric spark.

The size and capacity of the pump depends entirely upon the number of gallons per minute required at each draw-off point and the number of draw-off panels. (See Bulletins Nos. 4010 or 4025 for complete data on pumps.)



CUT No. 382 PANEL

Mounted on Concrete Column with Front Plate
Removed Showing Oil Switch and Shut-off Valve.

Auxiliary Pump: If desired, a small impeller hand pump may be connected into the suction line or the suction header near the power pump. This pump may be used for filling portable outfits, should the electric current be shut off, and so avoid a complete shut-down of the system.

Automatic Starter: A totally enclosed automatic electric starter is supplied with each motor. This electric starter also encloses the necessary main line knife switch. This starter is placed outside of the pump house at least 5 feet above the floor and is connected through proper conduit to the feed wires, the motor and the draw-off panels.



CUT No. 384. REMOTE CONTROL PANEL.
Furnished Without Meter for Use When Measurement Is Not Necessary.

Storage Tanks: The Storage Tanks used in connection with this system are of the standard type "A" or "S" models, identical with those used with an ordinary measuring or non-measuring hand pump. If it is desirable to place the tank under ground, the cylindrical type "A" is the most satisfactory and if the tank is to be placed in the basement or oil vault, the rectangular type "S" tank should be used. These tanks are filled and vented in the usual manner. (See Bulletins Nos. 79, 88 or 89 for tanks; and Bulletin No. 100 for fill and vent fittings.)

Installation: The storage tank should be filled and vented in the usual method as shown on the opposite page. Either the Combination Fill and Vent Pipe can be used or a 3" or 4" fill pipe can be run from the fill flange on the tank to a railroad siding so that the tank may be filled from tank cars.

All tanks should be fitted with a vent pipe of ample size and terminating in a vent header, or protector, placed at least ten feet above the ground and outside of the building.

The suction pipe from the tank to the pump should also be installed in exactly the same manner as would be required for a hand operated pump. This suction pipe running from the foot valves in the bottom of the tank to the pump. Double brass foot valves should always be installed.

When two or more tanks are to be connected to one pump, a separate suction pipe should be run from foot valves in the bottom of each tank to a suction header near the pump. Each of the suction lines should be fitted with a gate valve placed as near the suction header as possible, so that any one tank may be drawn from at will and the other tanks shut off.

One pump can not be used to handle or pump more than one kind of liquid. A separate pump should be installed for each oil or liquid. However, two pumps, or more, may be connected to the same tank, either by running separate suction lines or by connecting both pumps into the suction header with shut off valves for each pump so that either pump may be cut out entirely.

The discharge pipe should be run directly from the pump to the discharge points. This pipe should

always slope back to the pump and the suction line should slope from the pump back to the tank. Traps in these pipe lines should be carefully avoided.

When one cabinet or draw-off point is installed above another, a check valve should be placed in the supply pipe line, as shown in the drawing, directly above the tee connection.

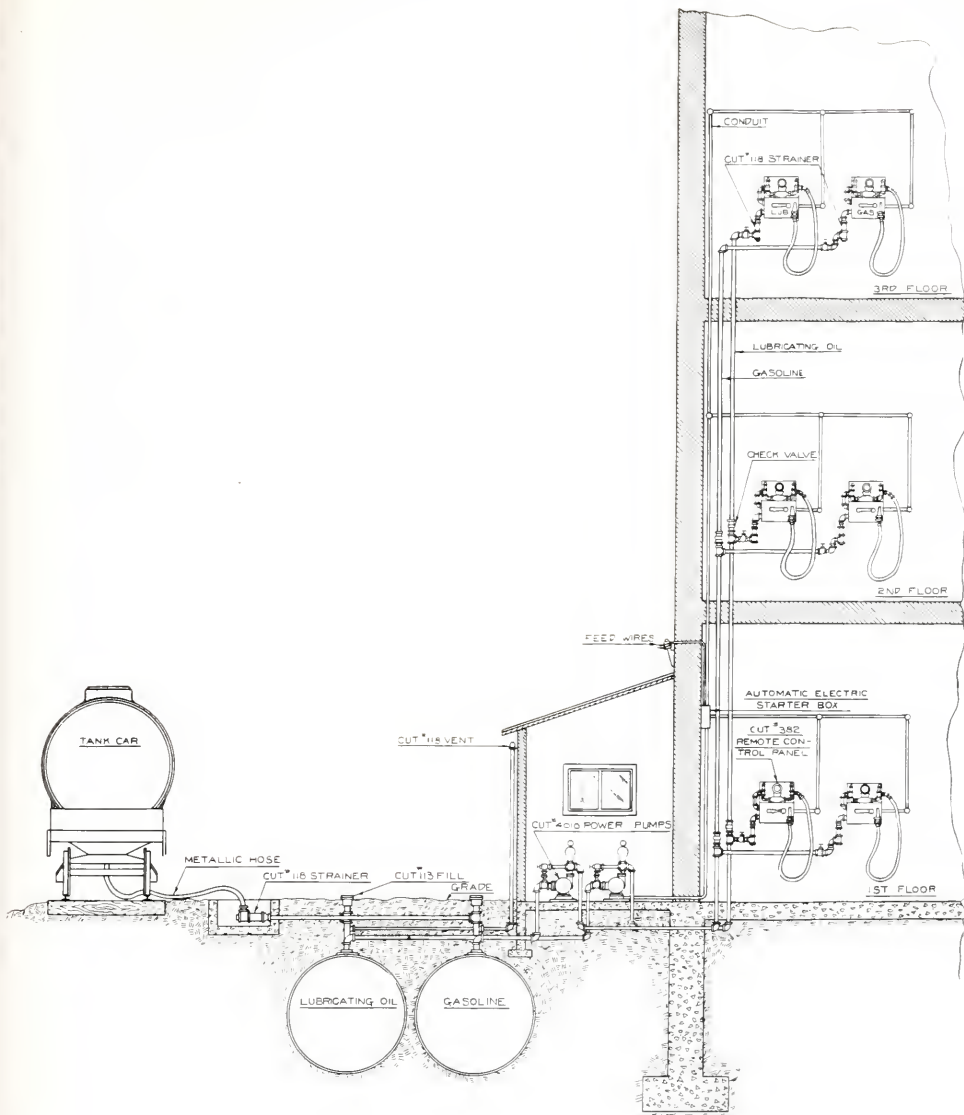
Great care should be taken in figuring the proper sizes of suction and discharge pipe. These pipes should be of ample size and correctly laid out so as to avoid unnecessary resistance to the flow. (For data on calculating the proper sizes of suction and discharge pipes see Bulletin No. 2.)

All pipe joints should be carefully cut and threaded and made up with a mixture of litharge and glycerine applied to the male thread. Lamp wicking, red lead, or white lead must not be used.

The electric feed wires are run directly from the electric meter to the automatic electric starter and from that point to the electric motor. Two wires are run to the contact point in the remote control panel. This electric work should always be done by a good electrician in accordance with the directions furnished with each outfit. All wires should be installed in approved metallic conduit. When more than one panel is connected up with one pump the system should be so wired that the motor will continue to run as long as any one switch is in contact.

When small alternating current motors are used they can be thrown directly on the line without the use of automatic starters. However, as the draw off point is usually some distance from the motor it is generally cheaper to install an automatic starter and only run two wires to the panel than it would be to run the necessary six wires to the discharge point.

In large installations where many draw-off points are required it is advisable to install a small motor driven pump for each draw-off point rather than install one large pump to take care of all the discharge points. The first cost is higher but such a system is most economical to operate as more than one draw-off point will seldom be in operation at one time.



REMOTE CONTROL SYSTEM FOR AUTOMOBILE FACTORY

5213-D

Method of Installing Automatic Remote Control System.

Wayne

Remote Control System
installed in the Garage of
the Fifth Avenue Coach
Co., New York City.



This system is used for storing and delivering gasoline to the buses operated by the Fifth Avenue Coach Co. The garage shown herein is probably the largest in the world, measuring 400 feet long and 300 feet wide.

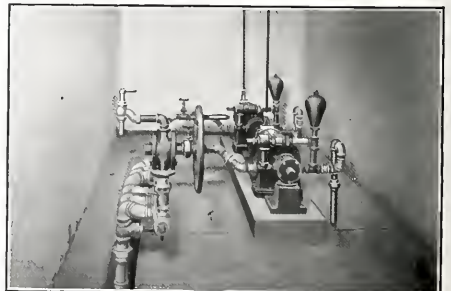
Under each half of the building six 8,000-gallon tanks are installed, or twelve 8,000-gallon tanks altogether, giving 96,000 gallons of storage. These tanks are filled by gravity from fill points at the curb.

The gasoline is drawn from these tanks by means of direct-connected motor driven pumps. Four pumps are placed in one pump room and two pumps in another similar room as shown in the illustration.

Each of the power pumps discharges to a separate Cut No. 382 Draw-off Panel. These six panels are mounted on columns at convenient points throughout the building. A discharge of 20 gallons per minute is secured at each of the draw-off points.

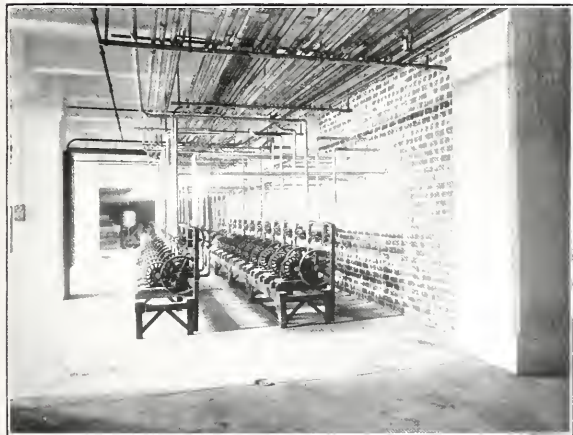
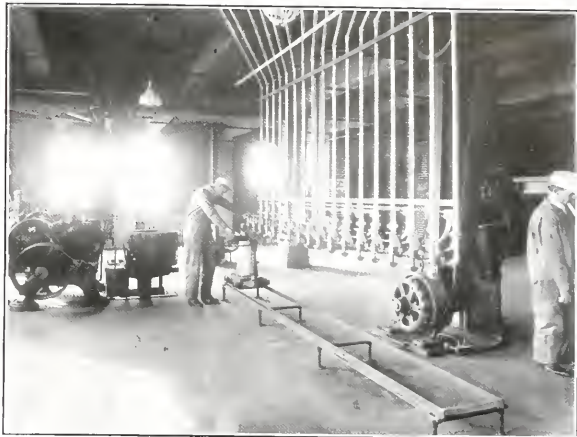
The illustration of one of the pump rooms also shows the small hand pump connected into the suction header so that should the electric current fail gasoline can always be drawn from any one of the tanks.

Each of the tanks is fitted with a Cut No. 336 Tank Gallonage Indicator, these indicators being enclosed in two batteries of six each in an airtight steel cabinet with a wire glass front.



Wayne

Remote Control System
installed in Large Paint
Manufacturing Plant.



This system was installed several years ago and has given exceptionally satisfactory results. Thirty different kinds of paint oils, japans, varnishes, etc., are handled.

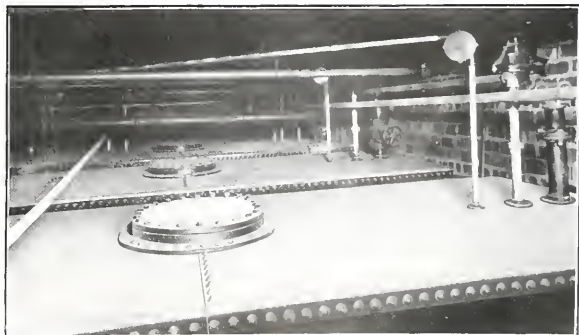
The installation consists of thirty large capacity Type "S" storage tanks, thirty direct-connected motor-driven pumps, nine hand pumps, and fifty-four remote control valves.

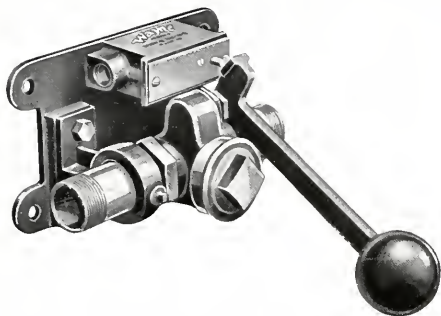
The storage tanks are all installed in a fireproof room in the basement

of a six-story building. The large tanks are filled by gravity from tank cars. The pumps are also placed in a fireproof pump room in the basement of the building.

The various oils are drawn from the tanks and discharged to the various points where used on the fourth, fifth and sixth floors of the building.

This paint factory is probably the most efficient plant of its kind in the country, the insurance rate being exceptionally low and labor being a very small item. The floors are clean and free from oil and paint stains.





Cut 386—Remote Control Valve

The Cut No. 386 Remote Control Valve is constructed for use with non-volatile oils only. It may be used in place of the Remote Control Panels and

in connection with the standard storage and pumping system described herein.

If desired, a Pipe Line Meter with Strainer and Air Relief Valve may be used in connection with this device.

A Quick Action Wedge Gate Type Valve is operated with a weighted lever handle. When this handle is raised, the valve is opened and the Electric Push Button Type Switch is pushed in. When the handle is released, it instantly drops, thereby throwing out the switch and instantly closing the gate valve. The weight on the end of the handle holds the valve firmly closed.

An Automatic Electric Starter must always be used in connection with this device on either alternating or direct current.

A PROVEN SUCCESS

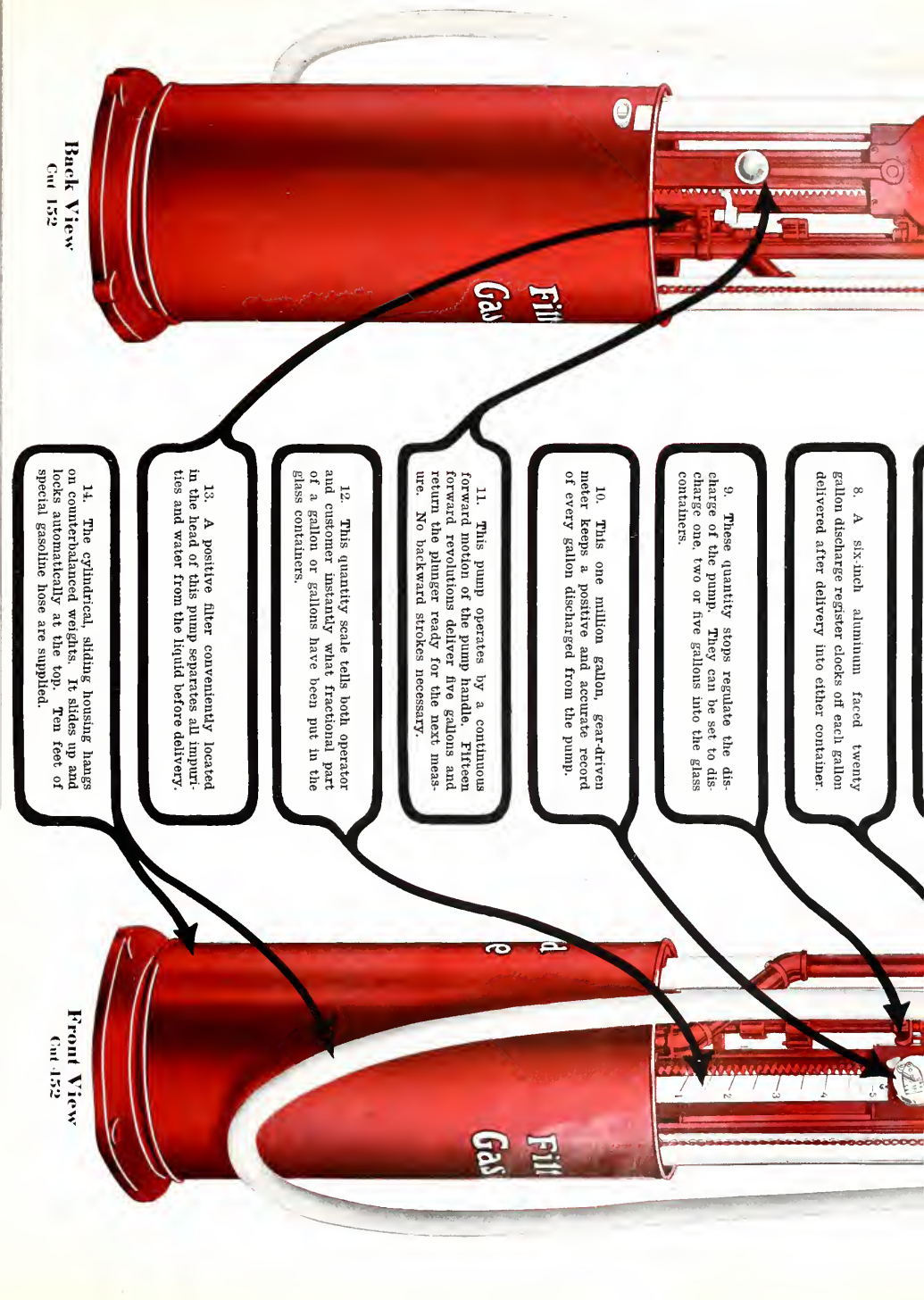
The Wayne Automatic Remote Control Electric Power System has been installed in several of the largest garages in the country for handling gasoline, in many industrial plants for handling all kinds of lubricating and paint oils, alcohol, etc.

This system has also been installed by The United States Government at several of the largest Hydroplane, Aeroplane and Submarine Chaser stations. One of these installations includes twenty-seven of the Cut No. 282 Panels and another fifteen of these Panels as well as large power pumps and storage tanks in each case.

DATA REQUIRED

It must be remembered that a complete system consists of the necessary tank, or tanks, power pump, electric motor, automatic electric starter, draw-off panel, and accessories. Naturally these various items vary in type and size to meet the different conditions. Therefore, in order to submit a quotation on a complete system we must be supplied with answers to as many of the following questions as is possible:

1. Is the tank, or tanks, to be placed out of doors, in doors, under ground or above ground?
2. What kind of oil or liquid do you wish to handle? If the liquid is not well known, send us a sample.
3. State kind of electric current to be used. If alternating state voltage, phase and cycle. If direct current state voltage. (Alternating current, two or three phase, is best.)
4. Number and sizes of tanks preferred? (See bulletins of standard sizes.)
5. Number and type of Draw-off Panels desired?
6. Number of gallons per minute required at each draw-off point?
7. Horizontal distance of each panel from pump?
8. Vertical distance of each panel above pump level?
9. Distance of pump level above bottom of tank? (Should not be over 12 feet.)
10. Horizontal distance of pump from tank?
11. If possible send us a sketch with dimensions showing proposed lay-out of the system.



8. A six-inch aluminum faced twenty gallon discharge register clocks off each gallon delivered after delivery into either container.

9. These quantity stops regulate the discharge of the pump. They can be set to discharge one, two or five gallons into the glass containers.

10. This one million gallon, gear-driven meter keeps a positive and accurate record of every gallon discharged from the pump.

11. This pump operates by a continuous forward motion of the pump handle. Fifteen forward revolutions deliver five gallons and return the plunger ready for the next measure. No backward strokes necessary.

12. This quantity scale tells both operator and customer instantly what fractional part of a gallon or gallons have been put in the glass containers.

13. A positive filter conveniently located in the head of this pump separates all impurities and water from the liquid before delivery.

14. The cylindrical, sliding housing hangs on counterbalanced weights. It slides up and locks automatically at the top. Ten feet of special gasoline hose are supplied.

Back View

Cut 152

Front View

Cut 152

Super-Visible Gasoline Pump

BULLETIN No. 452

General Description

The Wayne Super-Visible Cut 452 Pump is the culmination of more than four years of exhaustive experimental work and study on the part of Wayne's skilled pump engineers and designers.

A vast amount of money, time and effort has been spent in perfecting this model. The acid test of actual use under the most severe working conditions has proven it to be the most accurate, rapid, safe and economical visible pump offered for use.

ACCURACY: Every drop of gasoline delivered into the glass containers has been previously, accurately, mechanically measured once and mechanically checked three times. Positive, sealed quantity gauges in the glass containers visibly verify the measure.

VISIBILITY: A common cause for error in visible pumps is due to what is called "parallax." "Parallax" is the apparent changing of the relative position of the pointers and graduations due to the observer looking at them from different angles. Such graduations should be on the inside of the glass containers. Wayne eliminates parallax by doing this.

PROTECTION: The Wayne Five-Way Valve prevents the return of any gasoline to the underground tank while either container is being filled or emptied; none can be discharged from a container while it is being filled; none can be siphoned from a customer's car tank. The hose is completely drained after each delivery. There is no overflow pipe. If you turn the Serve Lever to the Right Serve you must turn the Fill Lever to the Left Fill Position or vice-versa. Turning the Fill Lever to Drain Position drains both containers.

SAFETY: Sparks, short circuits and fires are prevented as no motors are used. Explosive vapors are absent in the glass containers. The liquid in the glass containers may be returned to the underground tank at any time, except when delivery is being made to the customer, the drain pipe closing automatically. Any leak in the pipe lines is immediately noticeable by short measurement; this is not so with a power or pressure operated visible.

ECONOMY: One glass container may be filled while the other is being emptied. No waits are necessary. This increases sales. It can be operated as rapidly as any power pump. No extra pipe and fittings other than those required for an ordinary pump. It is delivered as an assembled unit.

EFFICIENCY: The gasoline is filtered, free from air and contains full power and mileage-giving qualities. The pump can be locked in or out of service, thus protecting the owner against fraud. The glass containers can be quickly and easily removed without affecting the measurement at all. The containers can readily be cleaned without removing them.

Note: It can be quickly converted into a piston-pump by attaching the hose to the overhead drain valve, opening the shut-off valve and moving the five-way valve to neut. neutral.

CONSTRUCTION: This model is constructed of heavy cast iron, brass and sheet steel. Valves are brass, carefully machined and then ground to fit. The patented continuous forward motion of the pump handle delivers five gallons with fifteen forward strokes, twenty gallons per minute. The sliding housing hangs on counterbalanced weights, slides up and locks at the top.

SUCTION AND DISCHARGE: Suction line is $1\frac{1}{2}$ ". Discharge is $1\frac{1}{4}$ ". The hose is $1\frac{1}{4}$ " and ten feet in length.

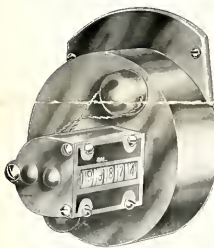
SPACE REQUIRED: The pump is $28\frac{1}{2}$ " in top diameter, $20\frac{1}{2}$ " base diameter and 9'-7" in height.

STANDARD EQUIPMENT: Pump complete as shown including $1\frac{1}{2}$ " foot valves, filter, meter, discharge register, quantity scale, globe, hose, hose tube, overhead drain valve, shut-off valve, and union for connecting suction line. Instructions for installation and operation accompany each pump.



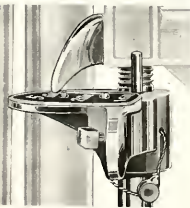
DISCHARGE REGISTER

A twenty-gallon irreversible discharge register, shows exactly how many gallons have been discharged. Aluminum faced, numbered in red and black. Illuminated by dome light.



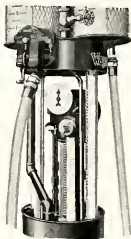
METER

A 1,000,000-gallon gear-driven meter which accurately records each gallon of liquid taken from the pump. Serves as an accurate bookkeeper.



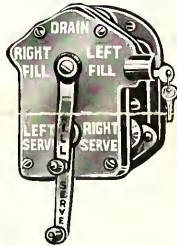
POSITIVE QUANTITY STOPS

These positive quantity stops regulate the discharge of the pump. They can be set to measure one, two and five gallons.



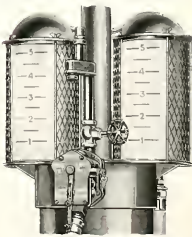
PUMP HEAD DETAIL

This shows the glass containers, five way valve, twenty-gallon discharge register, quantity stops, meter, shut-off valve and quantity scale.



THE FIVE-WAY VALVE

An exclusive mechanism that enables the operator to fill one container and empty the other simultaneously. Prevents any possibility of dishonesty or theft of liquid.



TWO GLASS CONTAINERS

This shows in detail the arrangement of the two five-gallon glass containers. Note the clear gallon and half-gallon markings, the gauge lines and heavy wire screening.

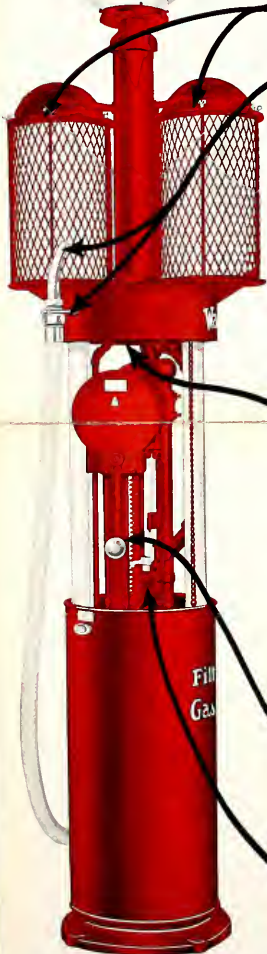
Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities Salesmen Everywhere

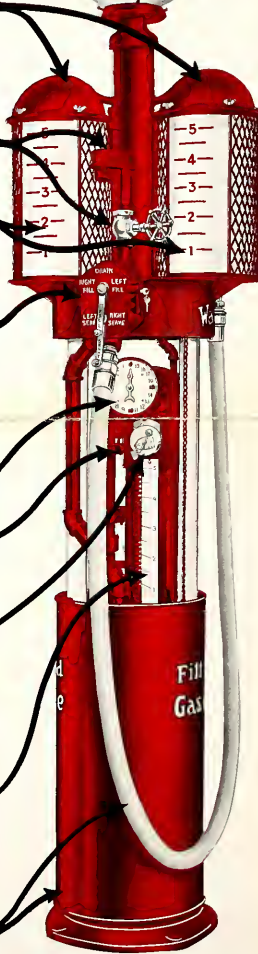
Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems Oil Filtration Systems Oil Burning Systems

Furnaces for Metal Melting, Forging and Heat Treating



**FILTERED
GASOLINE**



**FILTERED
GASOLINE**

1. An attractively lettered, sand blasted, sixteen-inch round glass globe. Lettering will not peel off or crack. Special globes may be furnished.

2. Two heavy glass containers with a capacity of five gallons each. Both are amply protected against breakage by heavy wire screens.

3. A heavy brass hose tube. The Yale lock prevents unauthorized use of the pump as the housing slides up and automatically locks.

4. The overhead drain valve automatically drains the hose. This shutoff valve makes it possible to use the pump either as a piston or visible type.

5. The gauge lines are on the inside of the containers, plainly marked and accurately placed, so as to show that the pump is set level. Avoids inaccuracy caused by parallax. Can be placed on side when used on island.

6. This five-way valve enables operator to fill one container while emptying the other or to discharge from either as desired and drain back at night.

7. A large electric light is supplied under the dome. This automatically lights at night when housing is lowered and shuts off when housing slides up.

8. A six-inch aluminum faced twenty gallon discharge register clicks off each gallon delivered after delivery into either container.

9. These quantity stops regulate the discharge of the pump. They can be set to discharge one, two or five gallons into the glass containers.

10. This one million gallon, gear-driven meter keeps a positive and accurate record of every gallon discharged from the pump.

11. This pump operates by a continuous forward motion of the pump handle. Fifteen forward revolutions deliver five gallons and return the plunger ready for the next measure. No backward strokes necessary.

12. This quantity scale tells both operator and customer instantly what fractional part of a gallon or gallons have been put in the glass containers.

13. A positive filter conveniently located in the head of this pump separates all impurities and water from the liquid before delivery.

14. The cylindrical, sliding housing hangs on counterbalanced weights. It slides up and locks automatically at the top. Ten feet of special gasoline hose are supplied.

Back View
Cut 152

Front View
Cut 152

Super-Visible Gasoline Pump

Bulletin No. 452

**FILTERED
GASOLINE**

1. An attractively lettered, sand blasted, sixteen-inch round glass globe. Lettering will not peel off or crack. Special globes may be furnished.

2. Two heavy glass containers with a capacity of five gallons each. Both are amply protected against breakage by heavy wire screens.

3. A heavy brass hose tube. The Yale lock prevents unauthorized use of the pump as the housing slides up and automatically locks.

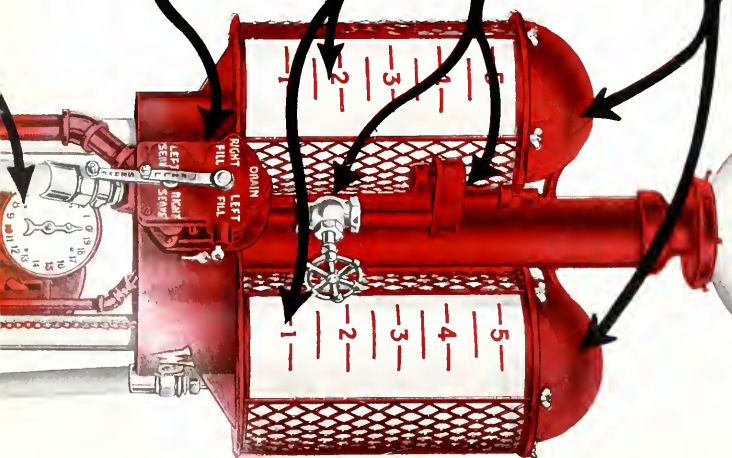
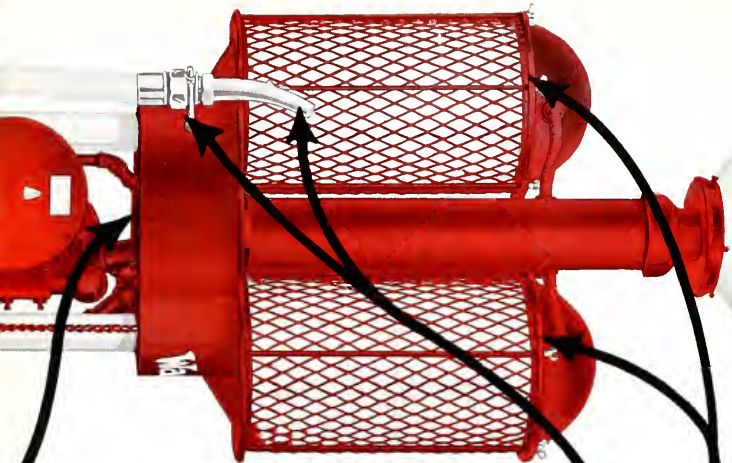
4. The overhead drain valve automatically drains the hose. This shutoff valve makes it possible to use the pump either as a piston or visible type.

5. The gauge lines are on the inside of the containers, plainly marked and accurately placed, so as to show that the pump is set level. Avoids inaccuracy caused by parallax. Can be placed on side when used on island.

6. This five-way valve enables operator to fill one container while emptying the other or to discharge from either as desired and drain back at night.

**FILTERED
GASOLINE**

7. A large electric light is supplied under the dome. This automatically lights at night.





Filling Station Illustrations

BULLETIN No. 981



Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

A Partial List of Oil and Filling Station Companies Assisted by the Department of Petroleum Engineering, Wayne Oil Tank & Pump Co.

NAME OF COMPANY	CITY	STATE
Albright, O. R.	St. Petersburg	Florida
Allen, D. H.	Raleigh	North Carolina
Bartles-Scott Oil Co.	Willmar	Minnesota
Boneberg, H. C.	Buffalo	New York
Boyd, W. L.	Pocahontas	Iowa
Buck Oil Co.	Worcester	Massachusetts
Care, J. K.	Lima	Ohio
Canton Automobile Co.	Canton	Mississippi
Christians, W. H.	Danville	Wyoming
Clifton, P. F.	Pomeroy	Ohio
Community Service Stations Co.	Davenport	Iowa
Consumers Service Stations, Inc.	Rock Island	Illinois
Decker, Beattie & Decker	Paw Paw	Michigan
Deyo Oil Co.	Binghamton	New York
Dixie Oil & Gas Co.	Detroit	Michigan
Dorsey, J. W.	Two Harbors	Minnesota
Econ Oil Co.	Lima	Ohio
Ellicott Motor Service Co.	Buffalo	New York
Emerick's Motor Bus Line	Bellefonte	Pennsylvania
Fairmount Fuel, Ice, Dray & Storage Co.	Fairmount	Minnesota
Ford Motor Co., O. D.	Martinsville	Virginia
Freeland Motor Co.	Henderson	North Carolina
Garden City Oil & Transfer Co.	Garden City	Missouri
Great Western Oil Co.	Grand Rapids	Michigan
Green Stone Service Station Co.	Baltimore	Maryland
Hamilton Oil Co.	Tonawanda	New York
Harley, O. M.	Teague	Texas
Harrison, C. H.	Warrensburg	Missouri
Haskell Automobile & Supply Co.	Glendive	Missouri
Hawkeye Oil Co.	Waterloo	Iowa
Henery Pater & Sons	Hamilton	Ohio
Industrial Alcohol Co.	New York City	New York
Jenner, J. T.	Palmetto	Florida
Keystone Auto Gas & Oil Co.	Pittsburgh	Pennsylvania
Koppers Products Co.	Pittsburgh	Pennsylvania
Lily White Oil Co.	Lima	Ohio
McAfee & Co., Don	Grand Rapids	Michigan
McAlester Refined Oil Co.	McAlester	Oklahoma
McKenzie & Wallace	Kalispell	Montana
Manhattan Oil Co.	Minneapolis	Minnesota
Marcus, B. M.	Olean	New York
Marland Refining Co.	Ponca City	Oklahoma
Merchants Oil Co.	Elmira	New York
Mission Oil & Gas Co.	Spokane	Washington
Moore Oil Co.	Cincinnati	Ohio
Northwestern Builder Supply Co.	Minot	North Dakota
Ohio Central Oil Co.	Columbus	Ohio
Ohio Refining Co.	Cincinnati	Ohio
Paragon Refining Co.	Toledo	Ohio
Parkhurst, J. W.	Moscow	Idaho
Pease Oil Co.	Buffalo	New York
Penn Oil Co.	Erie	Pennsylvania
Portage Tire Co.	Jacksonville	Florida
Quale Garage Co.	Buffalo	New York
Roswell Auto Co.	Roswell	New Mexico
Scheiwer, J. J.	Erie	Pennsylvania
Shappel Petroleum Products Co.	Lima	Ohio
Sheridan Oil Co.	Creston	Iowa
Seiber Oil Co.	St. Joseph	Michigan
Springfield Oil Products Co.	Springfield	Ohio
Standard Auto Filling Sta. Co.	Danville	Virginia
Stoll Oil Co.	Louisville	Kentucky
Suburban Gas & Oil Co.	Harrisonville	Montana
Swartz Oil Co.	Elmira	New York
Trans-Continental Oil Co.	Pittsburgh	Pennsylvania
United Petroleum Co.	Detroit	Michigan
Western Petroleum Co.	Chicago	Illinois
White Bros. Oil Co.	Fort Erie	Canada
White Star Refining Co.	Detroit	Michigan



Humble Oil & Refining Co.
Houston, Texas



The Texas Co. of Houston, Texas



J. H. Martindale Filling Station
of Dallas, Texas



Edwards Filling Station
Dallas, Texas



Pierce-Fordyce Oil Co.
Wichita Falls, Texas



Refiners Oil Co of Dayton, Ohio. Type of Station Used
at Cincinnati, Ohio



Portsmouth Oil Co.
Portsmouth, Ohio



Standard Oil Co. at Lima, Ohio, and Other Cities.
Portable Sheet Metal Type



National Refining Co. of Cleveland, Ohio. Type of
Station Used at Peoria, Ill., and Other Cities



Standard Oil Co. Type of Station Used at Chicago, Ill.,
and Other Cities



Independent Filling Station
Toledo, Ohio



Consumers Service Stations, Inc., of Rock Island, Ill.
Type of Station Used at Monmouth, Ill.,
and Other Cities



Pat Toal Filling Station Co.
Buffalo, N. Y.



Meyer's Filling Station
Oxnard, Cal.



Union Oil Co of Nevada
at Reno, Nevada



Moore Oil Co. of Cincinnati, Ohio. Type of Station Used
at Columbus, Ohio, and Other Cities



Sinclair Refining Co.
Chicago, Ill.



Standard Oil Co.
Fort Wayne, Ind.



Sinclair Refining Co. Type of Station Used at Chicago,
Ill., and Other Cities



Refiners Oil Co of Dayton, Ohio. Type of Station
Used at Toledo, Ohio



Standard Oil Co.
at Columbus, Ohio



Olmstead & Smith Filling Station
Seattle, Wash.



Gentry Oil Co., Enid, Okla.



Pure Oil Co., Minneapolis, Minn.



Cedar Rapids Oil Co., Cedar Rapids, Iowa.



The Texas Co., Atlanta, Ga.



Leighton's Filling Station, Endicott, N. Y.



Sinclair Refining Co. of Chicago, Ill. Type of Station
Used at Detroit, Mich.



H. C. Boneberg Filling Station at Buffalo, N. Y.
Sliding Doors



Northern California Motors Co.
of Yreka, Cal.



Standard Oil Co. of Davenport,
Iowa



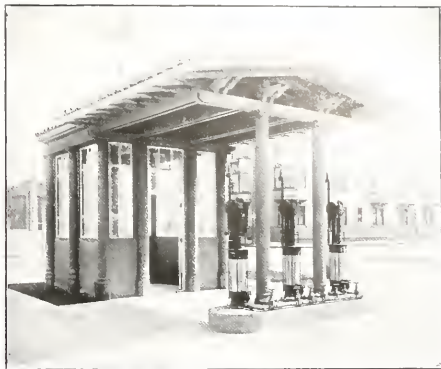
S. E. Allen Service Station
Tacoma, Wash.



Depot Service Station
Tacoma, Wash.



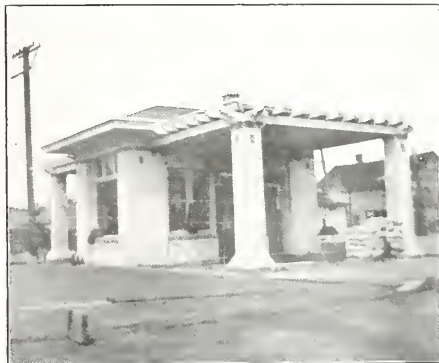
Associated Oil Co. of California at San Francisco, Cal.
Portable Steel Building



Associated Oil Co. of San Francisco, Cal. Type of
Station Used in Various Cities



Standard Oil Co.
at Cincinnati, Ohio



Sinclair Refining Co.
of Chicago, Ill.



Standard Oil Co.
at Peoria, Ill.



Rainbow Oil Co. of Columbus, Ohio
Portable Steel Building



**New England Oil & Products Co.
Waterbury, Conn.**



Independent Filling Station, Campbell, Mass.



U. S. Oil Co., Boston, Mass.



**Santa Fe Trail Filling Station
Santa Fe, N. M.**



**Elbertson Tire Service Co.
Decatur, Ind.**



Standard Oil Co. at Detroit, Mich.



Econ Oil Co. of Lima, Ohio



Ohio Cities Gas Co. of Columbus, Ohio. Type of Station
Used at Springfield, Ohio and other Cities



Ohio Cities Gas Co. of Columbus, Ohio. Type of Station
Used at Springfield, Ohio and other Cities



Shell Oil Co. of California. Station at
San Leandro, Calif.



Standard Oil Co. Station
at Detroit, Mich.



Ohio Cities Gas Co. of Columbus, Ohio. Type of Station
Used at Lima, Ohio



Ohio Cities Gas Co. of Columbus, Ohio. Type of Station
Used at Lima, Ohio



Standard Oil Co. at Chicago, Ill.



Standard Oil Co. at Detroit, Mich., and Other Cities



Sinclair Refining Co. of Chicago, Ill.



Sinclair Refining Co. of Chicago, Ill.



Crew Levick Filling Station, Philadelphia, Pa.



Pure Oil Co., Minneapolis, Minn.



Associated Oil Co. of San Francisco, Cal.
Portable Steel Building



Bartles Sweney Oil Co.
Peoria, Ill.



Western Refining Co., Wichita, Kan.



Haywood Filling Station, Venice Gateway
Beach, Cal.



Standard Oil Co. at Detroit, Mich.
Portable Steel Building



Springfield Oil Products Co. of Springfield, Ohio. Room
of Dwelling used as Office for Filling Station



Illinois Oil Co. of Rock Island, Ill. Type of Station
Used at Davenport, Iowa



Brooks Oil Co. of Cleveland, Ohio



The National Refining Co. at Cincinnati, Ohio



Corn Belt Oil Co., Marshalltown, Iowa



Paragon Refining Co. of Toledo, Ohio



White Star Refining Co. of Detroit, Mich.



Sinclair Refining Co. of Chicago, Ill. Type of Station
Used at Chicago, Ill., and Other Cities



Sinclair Refining Co. of Chicago, Ill. Type of Portable
Steel Building Used at Cleveland, Ohio and Other Cities



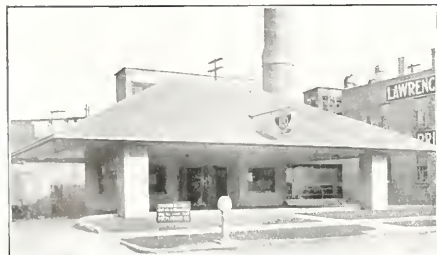
The Refiners Oil Co. of Dayton, Ohio



Eutterworth & Witherbee Filling Station
at Seattle, Wash.



Leighton's Ideal Filling Station
Endicott, New York



Reo Filling Station
Lansing, Mich.



Geo. Gaffney's Filling Station
Guthrie, Okla.



Sinclair Refining Co. of Chicago, Ill. Type of Station
Used at Fort Wayne, Ind., and other Cities



Great Western Oil Co.
of Cleveland, Ohio



One of the First Filling Stations in the United States,
Originally Built by R. L. Francis, Central Oil Co., De-
troit, Mich. Now Owned by Sinclair Refining Co. of
Chicago.



Ohio Cities Gas Co. of Columbus, Ohio. Type of
Station Used at Lima, Ohio



Bartles-Sweney Oil Co.
Peoria, Ill.



Moore Oil Co. of Cincinnati, Ohio. Type of Station
Used at Columbus and Other Cities



Sinclair Refining Co. of Chicago, Ill. Type of Station
Used at Cleveland, Ohio, and Other Cities



Olney Redmond Filling Station
Schenectady, N. Y.



Refiners Oil Co. of Dayton, Ohio. Type of Station
Used at Springfield, Ohio



Sinclair Refining Co. of Chicago, Ill. Type of Station
Used at Detroit, Mich.



Atlantic Refining Co.
Pittsburgh, Pa.



Ohrt's Filling Station
Colusa, Cal.



Atlantic Refining Co.
Philadelphia, Pa.



Atlantic Refining Co. Type of Station Used at
Pittsburgh and Other Cities



Lily White Oil Co.
Lima, Ohio



Associated Oil Co. of San Francisco, Cal.
Portable Steel Building



Atlantic Refining Co.
Philadelphia, Pa.



Gulf Refining Co.
Houston, Texas



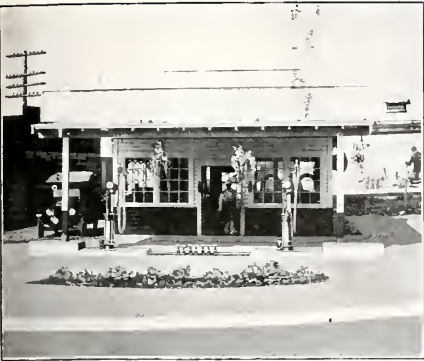
W. W. Wasson Filling Station
Norfolk, Neb.



Reed Oil Co., Atlanta, Ga.



The Connecticut Oil Co., Stamford, Conn.



Lawrence Galvin Filling Station
Chehalis, Wash.



Depot Service Station of Tacoma, Wash. Showing Pump
Island. Outside Lubricating Oil Pumps
with Underground Storage Tanks



Atlantic Refining Co. Type of Station Used at
Pittsburgh, Pa., and Other Cities



The Connecticut Oil Co.
Bridgeport, Conn.



W. W. Wasson Filling Station
Norfolk, Neb.



Louis B. Heeb Filling Station
Whittier, Cal.



Associated Oil Co. of California
Oakland, Cal.



Ellern Oil & Gas Service Station Co.
Lewiston, Idaho



Paragon Refining Co.
Toledo, Ohio



The Connecticut Oil Co.
Waterbury, Conn.



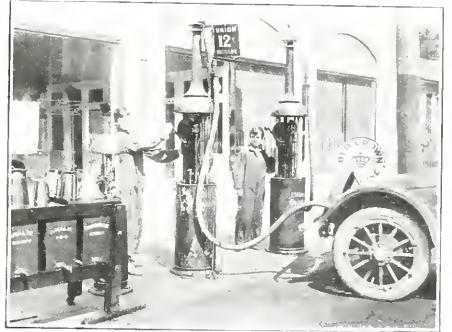
Vacuum Oil Co. of Rochester, N. Y. Station at Independence, Kan., Showing Outside Lubricating Oil Pumps With Underground Storage Tanks.



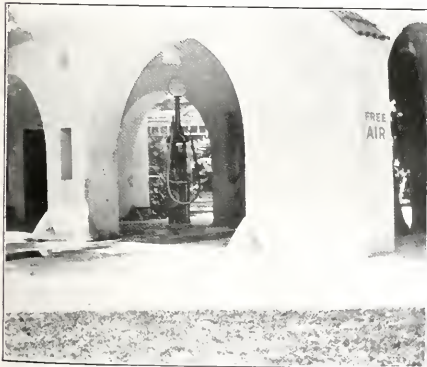
Pump Island and Light Post, Manhattan Oil Co., St. Paul, Minn.



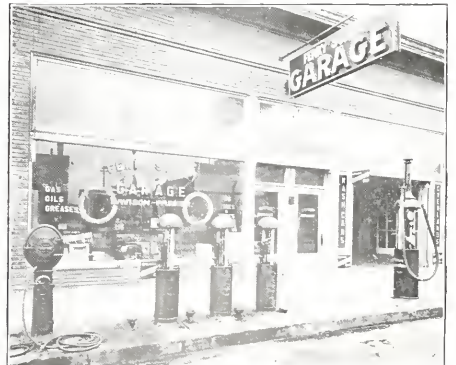
Pump Island Showing Outside Lubricating Oil Pump With Underground Storage, Also Air and Water Station



Pump Island With Both Portable and Stationary Lubricating Oil Storage. Lady Attendants



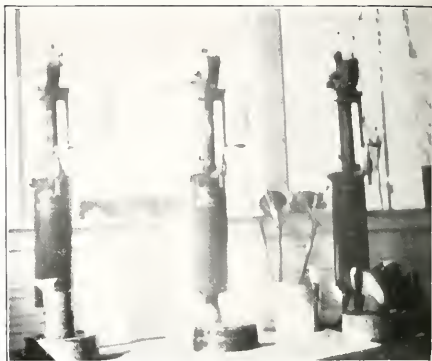
Palmco Service Station at Phoenix, Ariz.



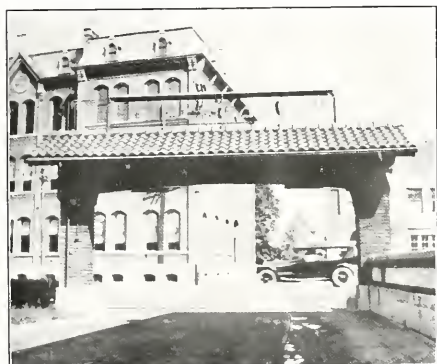
Showing Air Station and Outside Lubricating Oil Pumps With Underground Storage Tanks



Paragon Refining Co. of Toledo, Ohio. Inside Lubricating Oil Pumps With Storage Tanks in Basement



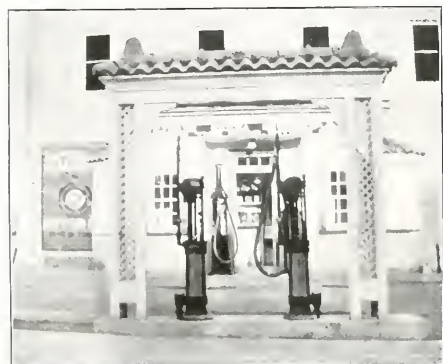
Portsmouth Oil Co. of Portsmouth, Ohio, Showing Inside Lubricating Oil Pumps With Storage Tanks in Basement



Cover to Driveway Approach. Moore Oil Co. of Cincinnati, Ohio



Decorative Cover for Pump Island Used by Econ Oil Co. of Lima, Ohio



Decorative Cover for Pump Island Used by Ohio Cities Gas Co. of Lima, Ohio



Decorative Cover for Pump Island Used by Ohio Cities Gas Co. at Lima, Ohio



Decorative Fence and Light Post Used by Standard Oil Co. at Washington, D. C.



Decorative Wall, Light Post and Air Station of Moore Oil Co., Cincinnati, Ohio



Type of Window With Ventilator in Center



Window Showing Swinging Ventilator in Center



Type of Bulletin Board Sign Used at Filling Stations



Type of Bulletin Board Signs for Use at Filling Stations



Light Post Used by Refiners Oil Co., Cincinnati, Ohio



Air Post Used by Ecom Oil Co., Lima, Ohio



Light Post Used by the Standard Oil Co. at Columbus, Ohio



Entrance Post Used by Bartles-Sweeney Oil Co. at Peoria, Ill.



Light Post Used by Sinclair Refining Co. at Chicago and Other Cities



Light Post Used by the Standard Oil Co. at Cincinnati, Ohio



Light Post Used by Paragon Refining Co. at Toledo, Ohio



Light Post Used by the Standard Oil Co. at Chicago, Ill.



Light Post Used by the Moore Oil Co. at Cincinnati, Ohio

If you are considering the building of one or more Filling Stations, tear out this sheet, answer the questions and send to us with a sketch of your property.

We shall be glad to assist you by furnishing ground layout plans, detail plans of building suitable for construction, etc. If you have your own engineer or architect we shall be glad to look over their plans for the purpose of offering suggestions.

This branch of our engineering department is maintained solely for the purpose of serving you - please use it. It involves no fee or other obligation on your part.

1. Give plan of lot, showing its exact dimensions.
2. If corners are not right angles, show exact angle in degrees and minutes.
3. Is grade of lot above or below sidewalk or street and how much?
4. How wide are sidewalks?
5. What is width between sidewalk and curb?
6. How wide are streets between curbs and how paved?
7. Has it a single or double streetcar track?
8. Is street on heavy grade? How much and in what direction does it rise?
9. Is street traffic heavy? On which side is it heaviest?
10. Are abutting streets under jurisdiction of City Council, or under Department of Parks and Boulevards?
11. Is there a local ordinance governing width or number of driveway approaches?
12. Show location of sewer, and give its depth, size and direction of flow.
13. Show location of water main and give its depth and size.
14. Are there buildings on the adjoining property?
15. Give kind of construction, how used and their condition.
16. How close to property line and street line are they located?
17. Is it a business or residence district?
18. Are there any building restrictions on property?
19. Is property owned or leased? If leased, for what term of years?
20. Does lease contain a vacation clause?
21. Show on sketch of property, exact location of all trees, telegraph, telephone, electric light, trolley or guy poles, hydrants, fire boxes, catch basins, etc., that might interfere with location of building or proposed driveways.
22. Are there any trees or poles which cannot be cut or removed?
23. Is lot located within fire limit as described in ordinance?
24. Must building be either fireproof or semi-fire proof construction?
25. Will city ordinance permit of macadam pavement inside property line?
26. Will it permit fill boxes for tanks to be located at curb?
27. Does it limit the maximum storage or size of tanks, and if so, what is the limit?
28. Will more than one grade of gasoline be handled?
29. Will kerosene be handled, and how many grades of lubricating oil?
30. Would you consider storing lubricating oils under ground like gasoline?
31. Will accessories be handled and are window displays desirable?
32. Give estimated daily gallonage.
33. Must a room be provided for storage of stock, canned goods, etc.?
34. What kind of electric current and what voltage is obtainable?
35. Is free air and water to be furnished?
36. Can air compressors or motors be hooked up to light line?
37. Do local ordinances necessitate putting heating plant, motors, or air compressors in a separate room?



Filling Station Plans

BULLETIN No. 982



Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

A Partial List of Oil Companies and Filling Station Companies Using Wayne Equipment

NOTE: The cities shown below, are the general offices of the Companies in question. Those marked with an asterisk (*) have stations and equipment in several cities.

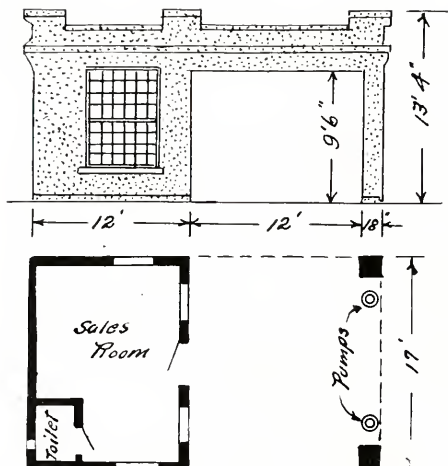
When garages or stores are listed, it indicates that they operate drive-in filling stations.

NAME OF COMPANY	CITY	STATE
A. B. C. Oil & Gasoline Co.	Lincoln	Nebr
Advance Oil Co.	Oil City	Pa.
Allen Street Oil Co.	Rochester	N. Y.
Alton Tank Line Co.	Alton	Iowa
American Petroleum Products Co.	Cleveland	Ohio
American Oil & Lubricating Works	Medina	N. Y.
American Oil & Line Co.	Fergus Falls	Mich.
American Oil Co.	Cambridge	Mass.
*American Oil Co.	Peoria	Ill.
American Oil Co.	Goodland	Kan.
American Sun Oil Co.	Glen Falls	N. Y.
Auto Inn-Sun Oil Co.	Grand Rapids	Mich.
*Associated Oil Co.	San Francisco	Cal.
*Atlantic Refining Co.	Philadelphia	Pa.
*Babbett Bros.	Flagstaff	Ariz.
B. & L. Oil Co.	Fauberg	Nebr.
Ball Filling Station	Wellington	Texas
Barker Oil Co.	Barker	N. Y.
*Bartles Oil Co.	St. Paul	Minn.
Bartles-Sheppard Oil Co.	Waterloo	Iowa
Bayerson Oil Co.	Erie	Pa.
Beatrice Filling Station	Beatrice	Nebr.
Beaver Refining Co.	Pittsburgh	Pa.
Belle Oil Co.	Tulsa	Okla.
Breits Filling Station	Coeur d'Alene	Idaho
Bristow Gasoline Supply Co.	Bristow	Okla.
*Brooks Oil Co.	Cleveland	Ohio
Brooks Ser. Sta.	Chandler	Ariz.
*Buffalo Refining Co.	Buffalo	N. Y.
Caldwell Bros. Oil Co.	Tecumseh	Okla.
California Oil Co.	Kansas City	Mo.
*Canfield Oil Co.	Cleveland	Ohio
Capitol Oil Co.	Salem	Mass.
Carbo Oil Co.	Cleveland	Ohio
Charlestown Oil Co.	Charlestown	S. C.
Chickasaw Refining Co.	Ardmore	Ariz.
Central Indiana Oil Co.	Indianapolis	Ind.
*Central Ohio Oil Co.	Columbus	Ohio
Central Oil Co.	Raynham	Mass.
*Central Oil Co.	Detroit	Mich.
*Cedar Rapids Oil Co.	Cedar Rapids	Iowa
Clark, F. G. & Co.	Cleveland	Ohio
Clark's Garage	Tucson	Ariz.
Clinton Oil Co.	Clinton	Mo.
Coils Oil Co.	Rolston	Okla.
Collins Oil Co., S. L.	Knoxville	Iowa
Columbia Refining Co.	Cleveland	Ohio
*Columbia Oil Co.	Washington	D. C.
*Community Service Station Co.	Davenport	Iowa
*Conn. Oil Co.	Waterbury	Conn.
Consumer's Oil Co.	Buffalo	N. Y.
Consumer's Oil Co.	Nortonville	Ky.
*Consumer's Ser. Sta. Co.	Rock Island	Ill.
*Corn Belt Oil Co.	Marshalltown	Iowa
Cortland Specialty Co.	Cortland	N. Y.
*Crow-Lewick Co.	Philadelphia	Pa.
Crown Petroleum Co.	Vinita	Okla.
Crown Oil Co., Inc.	Syracuse	N. Y.
Crown Oil & Wax Co.	Baltimore	Md.
*Deyo Independent Oil Co.	Binghamton	N. Y.
Diamond Oil Co.	Stamford	Conn.
Dishman Filling Station	Dishman	Wash.
Dixie Oil & Gas Co.	Detroit	Mich.
Dutree Wilcox Flint Gas Co.	Providence	R. I.
Econ Oil & Gas Co.	Lima	Ohio
Economy Oil Co.	Detroit	Mich.
Ellern Service Station	Lewiston	Idaho
Ellicott Motor Service Corp.	Buffalo	N. Y.

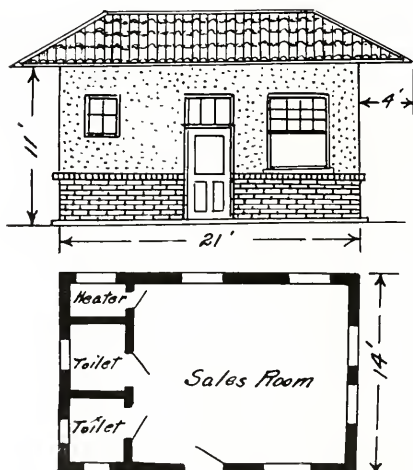
Elm Tree Auto Supply Co.	Medina	N. Y.
Empire Garage & Gasoline Co.	Glen Falls	N. Y.
Evansville Oil Co.	Evansville	Ind.
Evansville Oil Co.	Owensboro	Ky.
Eureka Oil Co.	Marshall	Minn.
Factory Oil Co.	Akron	Ohio
Fanci Oil Co.	Boston	Mass.
Farmers Oil Co.	Alva	Okla.
Flint Gasoline Co., D. W.	E. Providence	R. I.
Fort Scott Oil Co.	Fort Scott	Kan.
Foster Lockwood Oil Co.	Racine	Wis.
Franklin Overland Co.	Holbrook	Ariz.
Gay Oil Co.	Hot Springs	Ark.
Gaffill Oil Co.	South Bend	Ind.
Ganz Oil Co., A.	Ansonia	Conn.
Gentry Oil Co.	Enid	Ohio
Gerkins Oil Co.	Dayton	Ohio
Gennessee Oil & Supply Co.	Rochester	N. Y.
*Grand Rapids Oil Co.	Grand Rapids	Mich.
*Great Western Oil Co.	Cleveland	Ohio
Great Western Oil Rfg. Co.	Kansas City	Okla.
Goodrich Oil Co.	Providence	R. I.
Goodwill Oil Co.	Lahoma	Okla.
*Gulf Refining Co.	Pittsburgh	Pa.
Hamilton Oil Co.	Tonawanda	N. Y.
*Harris & Co., Elmer E.	Buffalo	N. Y.
Hawkeye Oil Co.	Waterloo	Iowa
*Hawkeye Oil Works	Batavia	N. Y.
Heyden Bros.	Wilkenburg	Ariz.
Highway Motor Service Station	Petersburg	Pa.
*Hisgen Bros. Oil Co.	Albany	N. Y.
*Home Oil Co.	Moorehead	Minn.
Homing Oil Corp.	Homing	Okla.
Hotchkiss Oil Co.	Raymond	Nebr.
*Humble Oil & Rfg. Co.	Houston	Texas
Illinois Oil Co.	Rock Island	Ill.
*Independent Oil Co.	Brockton	Mass.
Independent Oil Co.	Lincoln	Ill.
Independent Oil Co.	Guyman	Okla.
Independent Oil Co.	Mt. Joy	Pa.
*Independent Distributing Co.	Columbus	Ohio
Indian Refining Co.	Cleveland	Ohio
Indian Petroleum Co.	Cedar Rapids	Iowa
Iowa Oil Co.	Dubuque	Iowa
Jenny Manufacturing Co.	Boston	Mass.
Johnson Garage	Nogales	Ariz.
Jones, Albert	Prescott	Ariz.
Jordan Oil Co.	Gnyman	Okla.
Kams Bros.	Nogales	Ariz.
Kendall Refining Co.	Warren	Pa.
*Kentucky Independent Oil Co.	Covington	Ky.
Keystone Auto Gas & Oil Co.	Pittsburgh	Pa.
Keystone State Oil Co.	Providence	R. I.
Kinky Oil Rfg. Co.	Okmulgee	Okla.
*King Oil Co.	Beloit	Kan.
Kingman Trading Co.	Kingman	Ariz.
Klein Oil Co.	Oklahoma City	Okla.
Koppers Product Co.	Pittsburgh	Pa.
Lawton Refining Co.	Lawton	Okla.
*Leader Oil Co.	Dubuque	Iowa
Lee Oil Co., A. W.	Oklahoma City	Okla.
Lehigh Oil Co.	Scranton	Pa.
Lesh Refining Co.	Concordia	Kan.
Liberty Refining Co.	Pittsburgh	Pa.
Liberty Oil Co.	Everett	Mass.
Liberty Oil Co.	Lewistown	Mont.
Lily White Oil Co.	Lima	Ohio
Lincoln Oil Co.	Detroit	Mich.
Little & Coffin Oil Co.	Portland	Me.
Long Oil Co.	Topeka	Kan.
Louisiana Oil Rfg. Co.	Shreveport	La.
Lookout Auto Supply Co.	Chattanooga	Tenn.
*Lubric Oil Co.	Cleveland	Ohio
Lubricating Producers Co.	San Francisco	Cal.
Mae & Mae Oil Co.	Anderson	S. C.
Mack Service Station	Prescott	Ariz.
M. B. Oil Co.	Tulsa	Okla.

Maloney Oil Co	Scranton	Pa.
Main Motor Supply	Yuma	Ariz.
Marshall, G. W. & Son	North Rose	N. Y.
*Manhattan Oil Co	Minneapolis	Minn.
Markville Oil Co., E. J.	Detroit	Mich.
Marshall Oil Co.	Marshalltown	Iowa
Marshall Oil Co.	Rockhill	S. C.
Marshallfield Hdw. Co	Marshallfield	Wis.
Mass Service Station	Benson	Ariz.
McKay Oil Co, E. S.	Detroit	Mich.
Medina Oil Works	Medina	N. Y.
Merchants Oil Co	Elmira	N. Y.
Middle West Refining Co	Columbus	Ohio
Miller Sons Co., A. D.	Pittsburgh	Pa.
Mills Oil Co	Syracuse	N. Y.
Moberly Oil Co	Elmer	Mo.
Moline Oil Co.	Moline	Iowa
Monroe County Oil Co	Rochester	N. Y.
*Moore Oil Co.	Cincinnati	Ohio
Motor Supply Co.	Tucson	Ariz.
Munger Oil Co.	Sumner	Iowa
Mutual Oil Co.	Kansas City	Mo.
Mystic Oil Co	Mystic	Iowa
*National Refiners Oil Co	Cleveland	Ohio
*National Refining Co	Cleveland	Ohio
*New England Oil & Producing Co	Waterbury	Conn.
New Renn Petroleum Co	Santa Maria	Cal.
Newtons Garage	Neco	Ariz.
Nichodemus Oil Co.	Saginaw	Mich.
North End Auto Supply Co.	Troy	N. Y.
Northern Oil Co.	Virginia	Minn.
Northern Oil Co.	Richmond	Va.
Northwestern Oil & Supply Co.	Detroit	Mich.
Oatman Service Station	Oatman	Ariz.
*Ohio Cities Gas Co	Columbus	Ohio
Omaha Refining Co	Omaha	Nebr.
Oklahoma Garage	Somerton	Ariz.
Old Trail's Garage	Kingman	Ariz.
Orleans County Independent Oil Co.	Albion	N. Y.
Pacific Independent Oil Co	Scranton	Pa.
*Paragon Refining Co	Toledo	Ohio
Paragon Safety Oil Co	Evansville	Ind.
Patterson Garage	Tucson	Ariz.
*Pease Oil Co.	Buffalo	N. Y.
Peerless Filling Station Co	Des Moines	Iowa
*Pennsylvania Independent Oil Co.	Bethlehem	Pa.
Pennsylvania Oil Co	Madison	Wis.
Pennsylvania Oil Co	Pittsburgh	Pa.
*Penn Oil Co.	Philadelphia	Pa.
Penn Petroleum Products Co.	Providence	R. I.
Peoples Oil Co	Augusta	Ga.
Phoenix Oil Co	Phoenix	Ariz.
Phoenix Oil Co	Cleveland	Ohio
Pickerall Service Station	Prescott	Ariz.
*Pierce Oil Corp.	Houston	Texas
Pierce-Fordyce Oil Co	Dallas	Texas
Pierce Oil Corp.	New York	N. Y.
Pittsburgh Oil Refining Co.	Pittsburgh	Pa.
Plains Oil Co.	Kansas City	Mo.
Platte Oil Co., The	Kearney	Nebr.
Prescott Service Station	Prescott	Ariz.
Prewitt Service Station	Nogales	Ariz.
Producers Refining Co	Fort Worth	Texas
Polarine Oil Co	Mariette	Okla.
Pure Oil Co.	Parsens	Pa.
*Pure Oil Co	Minneapolis	Minn.
*Pure Oil White Cities Gas Co	East Newark	N. J.
Puerto Oil Co.	Los Angeles	Cal.
Quality Filling Station	Tama	Iowa
Quincy Oil Co	Quincy	Mass.
Rae, F. B., Oil Co., Inc	Rochester	N. Y.
Rainbow Oil Co	Columbus	Ohio
*Red "C" Oil Co	Baltimore	Md.
Redmond, O	Schneectady	N. Y.
*Reed Oil Co	Atlanta	Ga.
*Refiners Oil Co.	Dayton	Ohio
Reserve Trust Co	Rock Island	Ill.

Richmond Oil Co	Richmond	..Va.
Riverview Oil & Gas Co	Detroit	Mich.
Roberts & Rends	Tuscon	Ariz.
Rochester Gas & Oil Corp.....	Rochester	N. Y.
Rohde Bros Oil Co	Rock Rapids	Iowa
Shaffer Garage.....	Tuscon	Ariz.
Shaffer Oil & Refining Co	Omaha	Nebr.
Snellby Service Station	Nogales	Ariz.
*Shell Oil Co	San Francisco	Cal.
Snappels Petroleum Products Co.	Lima	Ohio
Sherwood Bros	Baltimore	Md.
*Sieber Oil Co	St. Joseph	Mich.
*Sinclair Refining Co	Chicago	Ill.
*Singer Oil Co	Hartford	Conn.
Sloane-Cordell Service Station	Oklahoma City	Okla.
Smelter Service Station.....	Globe	Ariz.
Son Oil Products Corp	Buffalo	N. Y.
Southern Ariz. Motor Co	Tuscon	Ariz.
Southern Oil Corp	Drumwright	Okla.
Southeastern Oil Co	Chattanooga	Tenn.
Southwick Oil Co., T. T.	Rochester	N. Y.
Sparks Bros	Waco	Texas
Springfield Oil Products Co	Springfield	Ohio
*Standard Oil Co. of Ind	South Bend	Ind.
*Standard Oil Co	Henderson	Ky.
*Standard Oil Co of N. Y	Washington	D. C.
Stanton Oil Co	Stanton	Nebr.
St. Cloud Oil Co	St. Cloud	Minn.
Stelk Oil Co	Omaha	Nebr.
Sterling Oil Corp	Buffalo	N. Y.
*Sun Oil Co	Philadelphia	Pa.
*Suor Oil Products Corp	Buffalo	N. Y.
*Texas Oil Co	Houston	Texas
*Texas Co., The	New York	N. Y.
*Tidewater Oil Co	New York	N. Y.
Tracy Filling Station	Spokane	Wash.
*Trans-Continental Oil Co	Pittsburgh	Pa.
Trans-Continental Oil Co	Des Moines	Iowa
Triangle Oil Co	North Lausung	Mich.
Tulsa Refining Co	Tulsa	Okla.
Tuscon Overland Co	Tuscon	Ariz.
*Union Oil Co. of Nevada	Reno	Nev.
Union Oil Co	Cleveland	Ohio
Union Oil Works	Rochester	N. Y.
Union Refining Co	Schenectady	N. Y.
*Union Oil Corp. of California	San Francisco	Cal.
U. S. Oil & Grease Co	Detroit	Mich.
U. S. Oil Co	Rochester	N. Y.
Van Tillburg Oil Co	Minneapolis	Minn.
*Valley Oil Co	Middletown	Conn.
Valvoline Oil Co	Portland	Me.
Valvoline Oil Co	Fond du Lac	Wis.
Vera Service Station	Vera	Wash.
Virginia Oil & Supply Co	Petersburg	Va.
Vulcan Oil Refining Co	Cleveland	Ohio
Wadham's Oil Co	Milwaukee	Wis.
*Waco Oil Co	Waco	Texas
Ward & Son	Moore	Okla.
*Warren Refining Co	Albany	N. Y.
Washington Garage	Washington	Okla.
Wasson Oil Co., W. W.	Norfolk	Nebr.
Waverly Oil Works Co	Pittsburgh	Pa.
Weeks Oil Co	Auburn	N. Y.
Wells, H.	Washington	Okla.
Western Rfg. Co	Wichita	Kan.
Westminster Oil Co	Westminster	S. C.
White Bros. Oil Co	Fort Erie	Can.
White Service Station	Tuscon	Ariz.
*White Star Rfg. Co	Detroit	Mich.
White Star Oil Co	Grinnell	Iowa
Wilkey-Wortman Oil Co	Phoenix	Ariz.
Williams, Floyd	Prescott	Ariz.
Williams Garage	Williams	Ariz.
Wilson's Garage	Buckeye	Ariz.
*Winona Oil Co	Winona	Minn.
Windsor Oil Co	Windsor	Mo.
World Oil Product Co	Binghamton	N. Y.
Z. & M. Independent Oil Co	Norwich	N. Y.

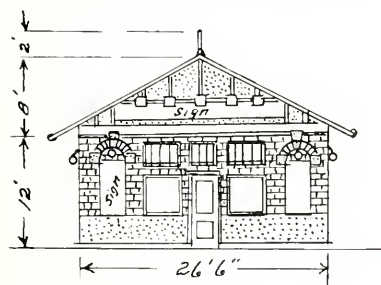
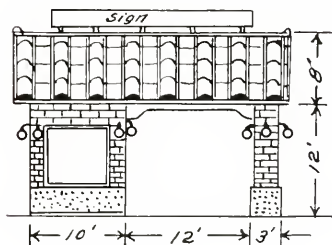
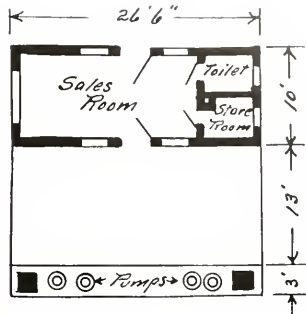
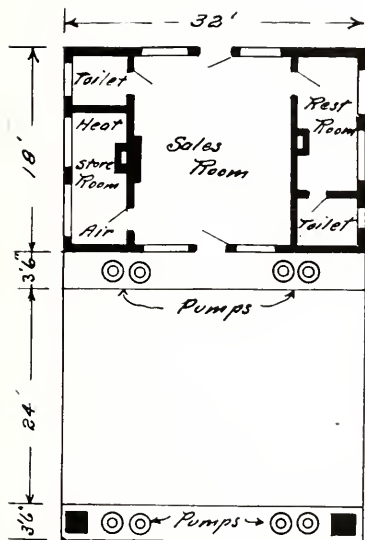


Semi fire proof construction. Timber frame with smooth cement finish outside. Plaster inside. Cement floor. Built up gravel roof.



All fire proof. May be all concrete, white tile or brick or brick to windowsill line with concrete, cement finished above. Inside plaster on metal lath. Pressed steel ceiling. Inside may also be white tile.

Concrete floor. Earthen tile or asbestos shingle roof.

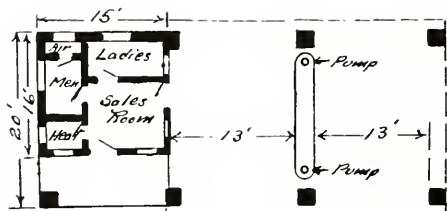


Fire proof construction. Concrete to window sill line, brick above to eaves, balance stucco veneer on brick with wood trim.

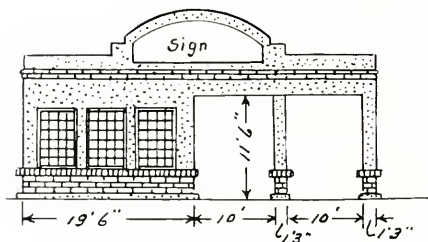
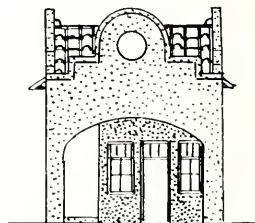
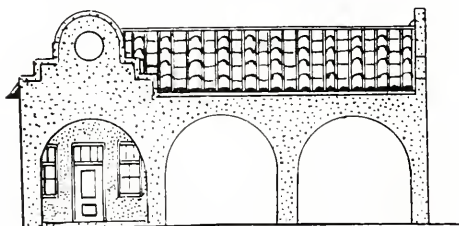
Inside finish of white glazed tile or plaster with mission finished wood trim.

Tile roof and concrete floor. Ornamental pressed steel for all ceilings including cover over driveway.

Heated by gas fire places or hot water system with gas hot water heater.



*Building of solid concrete.
Cement floor and tile
roof. - Plaster finish
inside.*

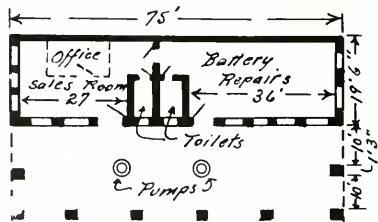


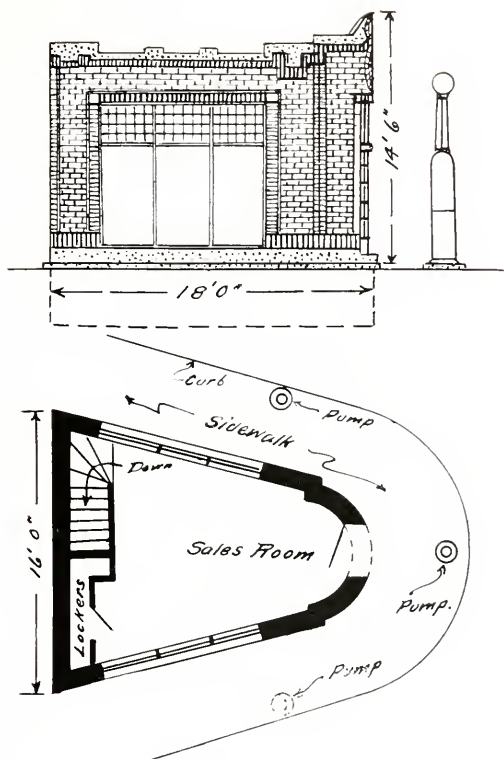
*Fire proof. Brick to window
sill line. Stucco on tile above.
Inside of battery repair room
unfinished brick, balanc
plaster on metal lath.*

*Concrete floor. Built up
gravel roof.*

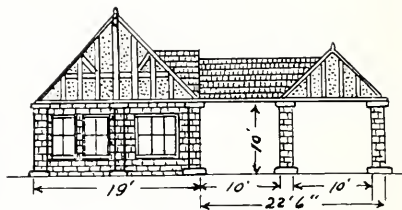
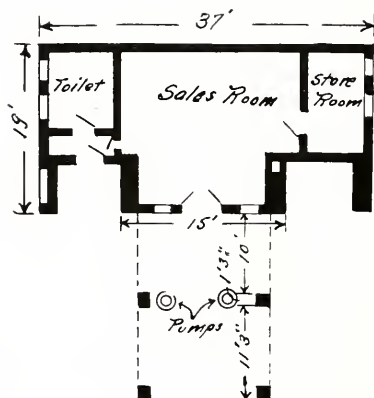
*Designed to handle fire
and accessory sales.*

*Heated by hot water plant.
No Basement.*





Curb station type. Building to cover small triangular lot. Air Compressor, toilet and heating plant in basement. Building of brick trimmed with concrete. Center window on each side to be of swinging type. Concrete floor and built up gravel roof. Printed by permission of Automobile Journal Publishing Company of Pawtucket, R. I.

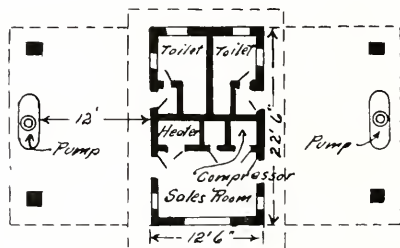


Side Elevation

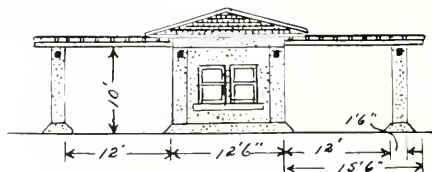


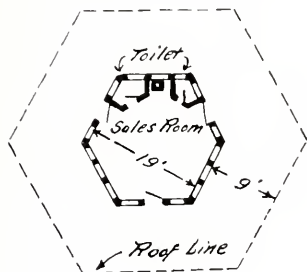
Front Elevation

Building & driveway roof supports to top of window line, balance of stucco finish with wood trimmings. All of roof of timber with shingles. Inside walls and ceiling of plaster on lath. Concrete floor.



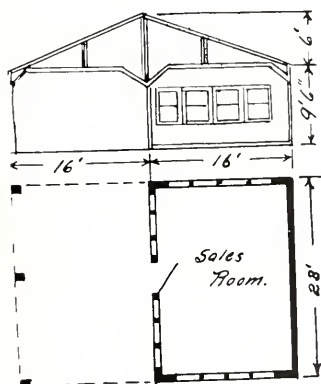
Building of Concrete with smooth cement finish. Inside walls and ceiling, cement plaster on metal lath. Concrete floor, asbestos shingle roof. No basement.





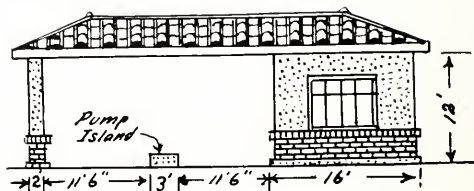
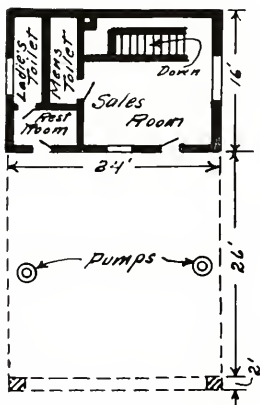
All fire proof construction. Outside of tile, glazed brick or concrete.

Inside plaster on metal lath with pressed steel ceiling. Underside of roof projection, pressed steel or cement finish. Concrete floor. Tile or asbestos shingle roof. May be built six or eight sided.

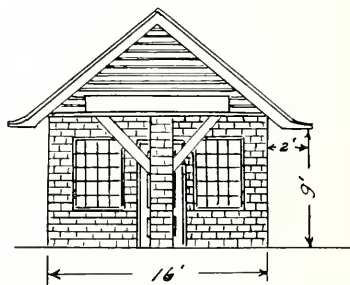
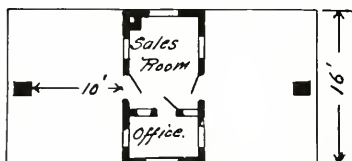
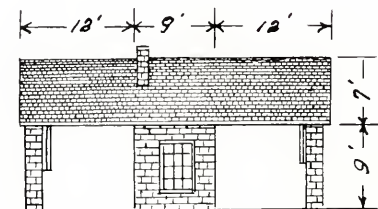


Frame work of 2" x 4" timbers covered with sheet metal.

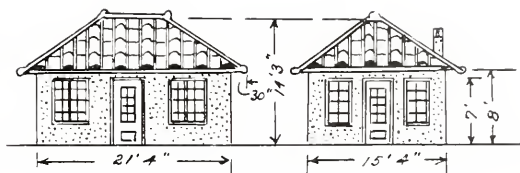
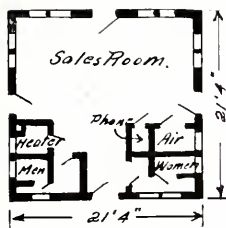
Window frames, sash, doors and door frames of wood. Wood floor. Tin roof. Inside not sealed or finished. Driveway roof supports of 4" x 4" timbers.



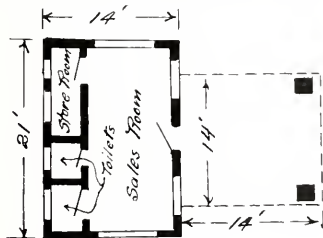
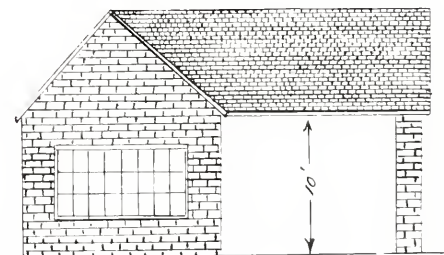
Brick to window sill line - Cement finish above. Plaster inside. Tile roof. Cement floor. Basement with heating plant, air compressor and storeroom.



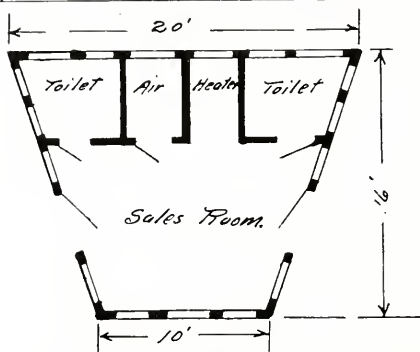
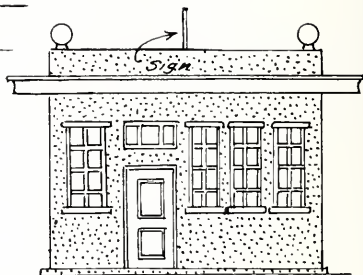
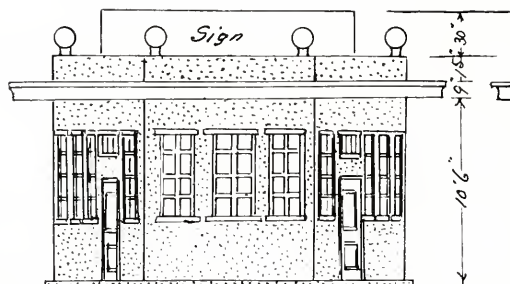
All brick with wood trimmings. Concrete floor and asbestos shingle roof. May also be built with drive way on one side of building only. Roof is also used as a cantilever without supports.



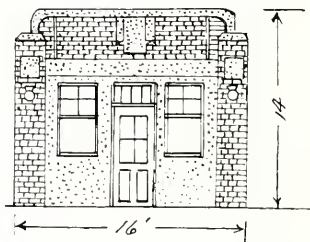
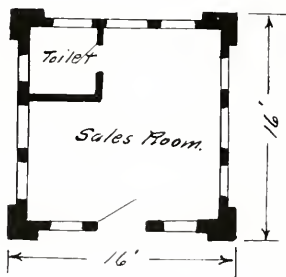
Bungalow type - Concrete floor and Metal tile roof. Walls of white stucco on hollow tile with mission wood trim. Inside plaster with mission wood trim. Beam ceiling.



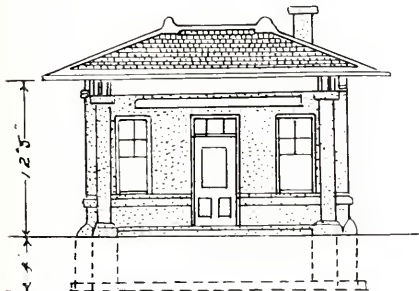
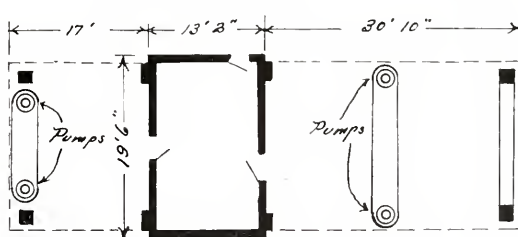
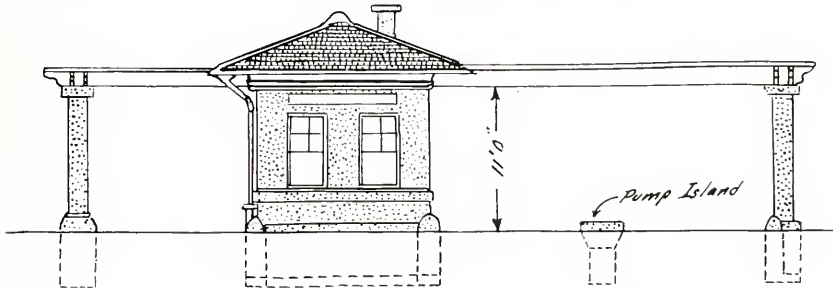
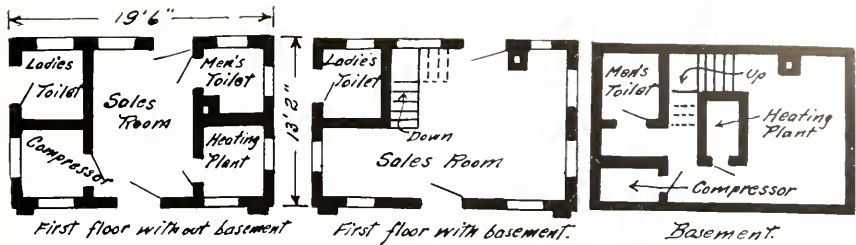
Fire proof or semi fire proof construction. Brick with concrete floor and asbestos shingle roof.



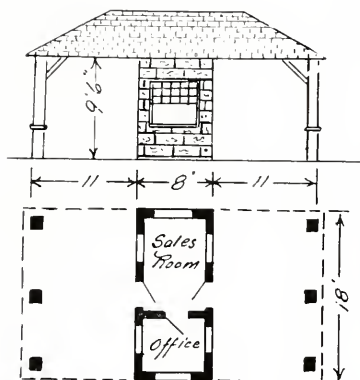
*Non fire proof construction.
Frame with stucco finish outside. Lath and plaster inside. Cement floor and prepared roof.*



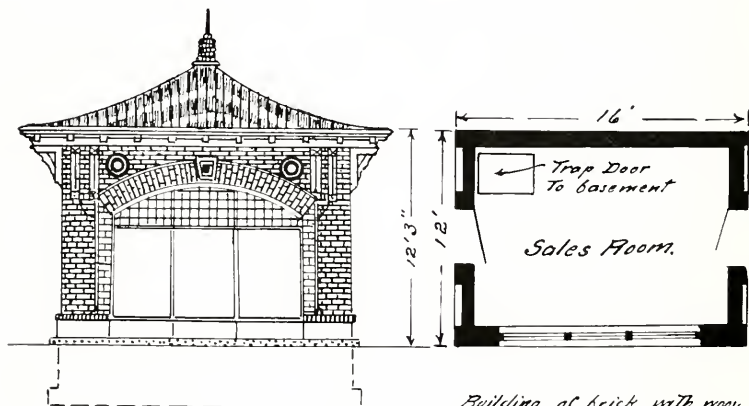
Fire proof construction - Wire cut brick with stone or concrete trimmings. Inside - plaster on brick. Concrete floor and roof. Steel window sash.



May be constructed as fire-proof, semi fire-proof or non fire-proof. May be built with or without basement also with or without covered driveways. May have either one or two toilets.

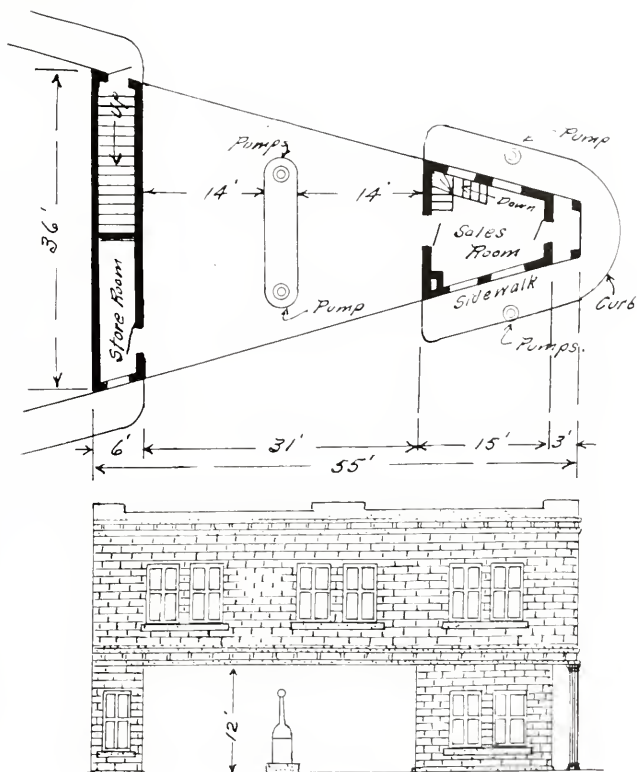


Non fire proof construction. Wood frame with pressed sheet steel (imitation concrete block) on outside. Plain sheet metal inside. Wood floor and wood shingle roof.



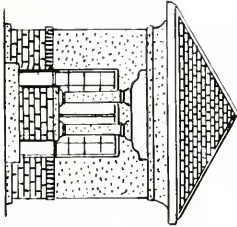
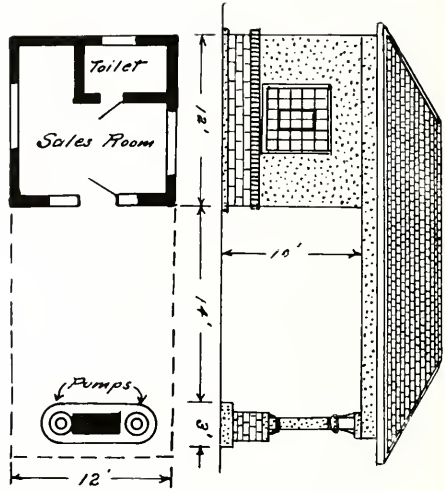
Building of brick with wood frame for roof covered with copper. Wood cornice. Red tile floor. Inside finish of plaster. Basement with toilet, heating plant and compressor. Entrance by winding steel stairway.

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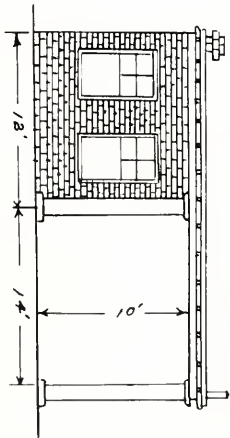
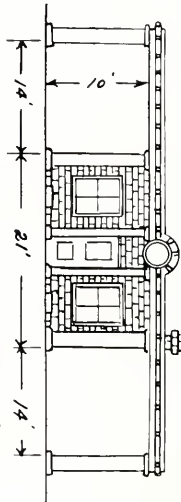
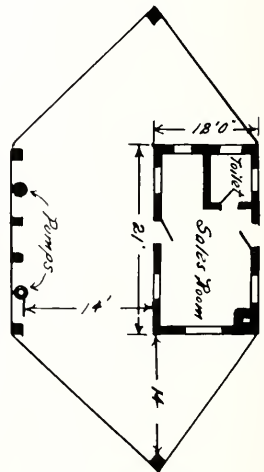
to cover small triangular lot. Filling station on first floor with offices on second floor

Building of solid brick trimmed with terra cotta and concrete. Second floor reinforced with I beams over driveway. Concrete driveway and cement floor in sales room. Built up gravel roof. Basement under sales room with heating plant, toilet and air compressor. Gasoline tanks under driveway with fill boxes at curb.

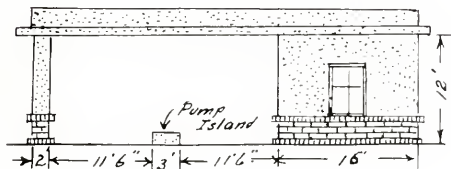
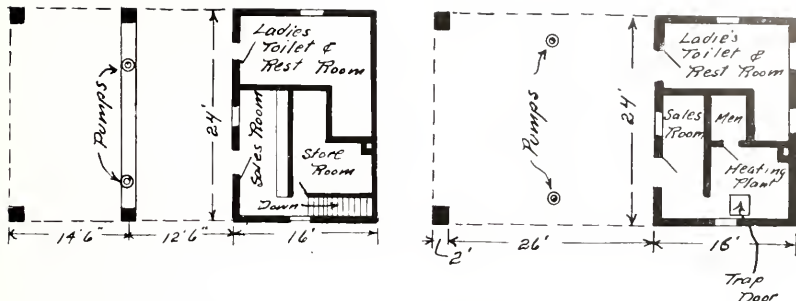


Shingle roof, concrete floor. No
Basement.

Wire cut brick to
window sill line,
granite stucco
finish above.
Inside plaster
finish. Asbestos



Fire proof - Building of brick, plaster
finish inside. Concrete floor. Prepared
roofing. Driveway roof and it's
supports of timber.

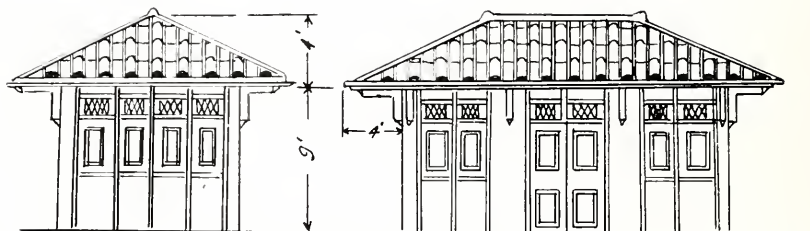


Semi-fire proof construction. Frame of 2"x4" timbers. Brick veneer to window sill line, stucco on lath above. Inside plaster on lath. Ceiling of driveway corer, ornamental steel panel, balance of cement stucco. Concrete floors. Built up gravel roof. Wood stairs

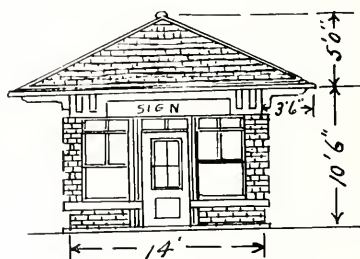
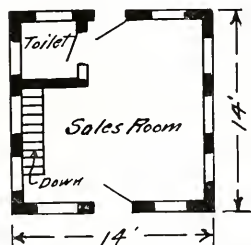
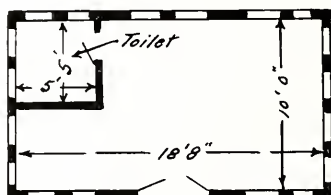
Driveway roof built with and without center supports.

When basement is used, it contains men's toilet, hot air furnace and coal room. Concrete basement floor. Air compressor in store room.

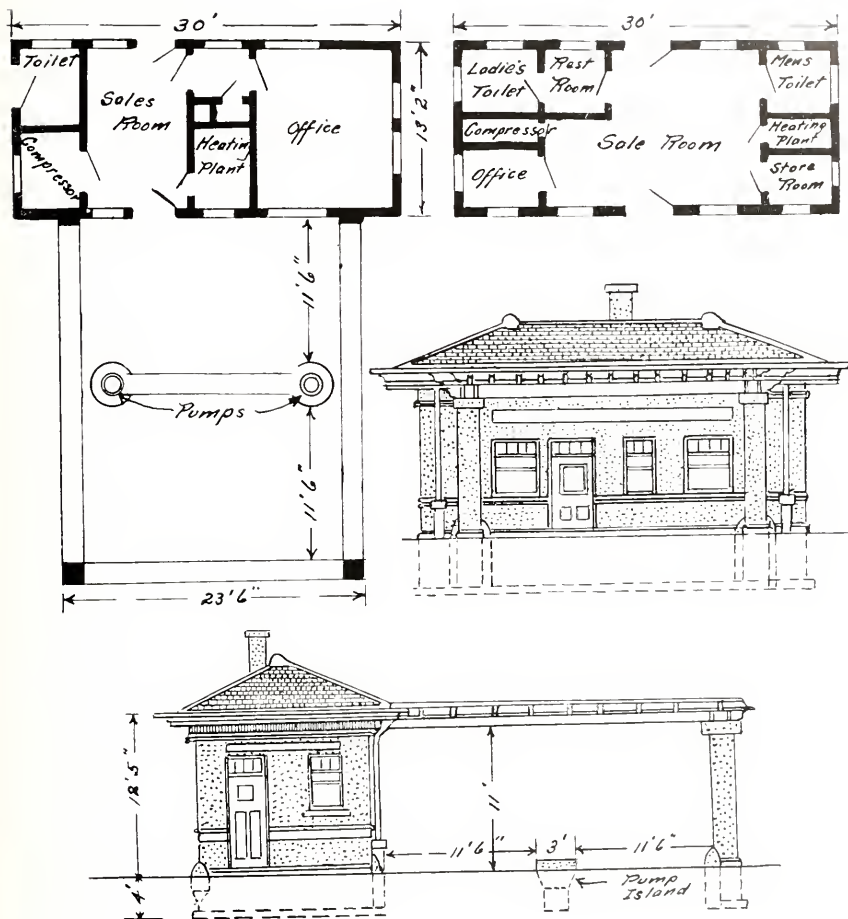
When full basement is not used, compressor is hoisted in a sub-basement about 6 feet square with entrance through trap door and iron ladder.



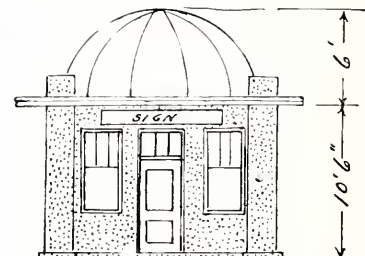
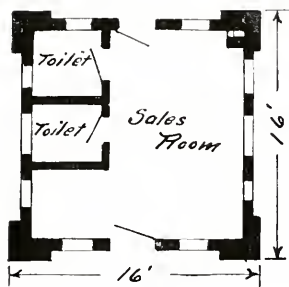
Portable, knock down building.
Steel frame, window frames and
sash. Side of No 20 gage galvaniz-
ed steel. Concrete floor. Roof of
Metal tile. Inside finish of
panel beaver board.



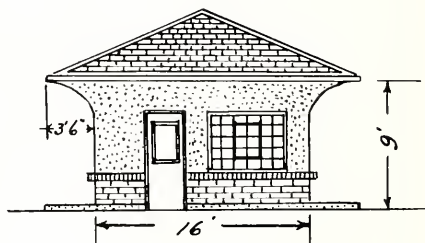
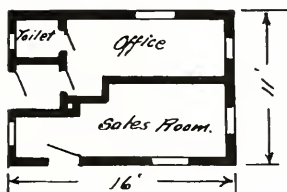
Semi fire proof. Brick with wood trimmings.
Plaster finish inside. Cement floor. Asbestos shingle roof.
Concrete stairs. Basement contains lubricating oil
storage, heating plant, air compressor and gentleman's
toilet.



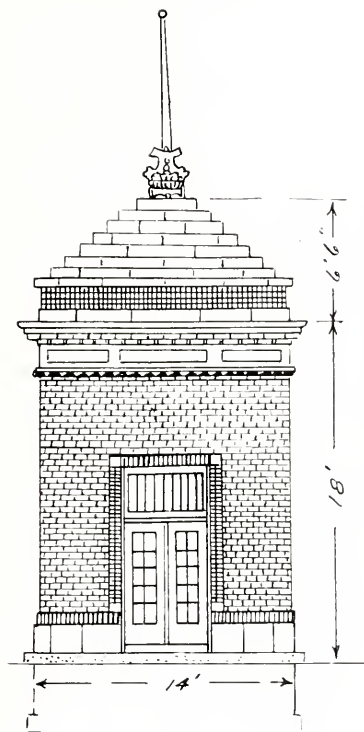
May be fire-proof, semi fire-proof or non fire-proof construction. and can be built with or without covered driveways. No basement.



Semi-fire proof construction. Stucco finish or brick veneer. Cement floor. Roof of timber frame with sheet metal covering.



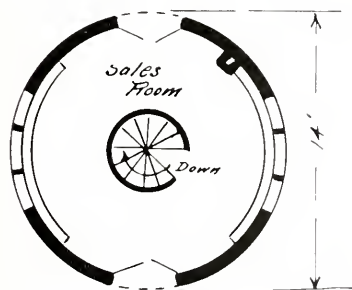
Semi-fire proof construction. Frame of timber. Wire cut brick veneer to window sill line, Red granite stucco finish above. Plaster inside. Concrete floor. Asbestos shingle roof.

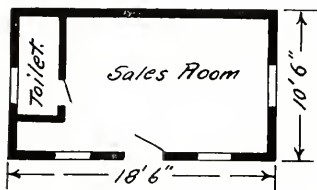
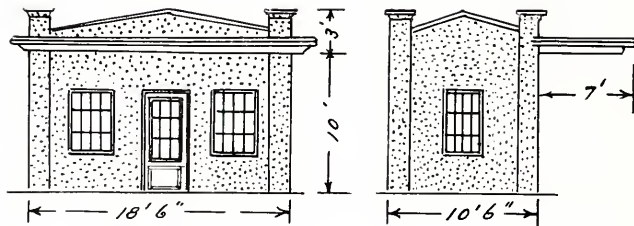


Building of brick trimmed with terra cotta. Plaster finish inside with ornamental steel ceiling. Concrete floor.

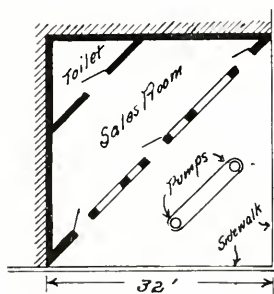
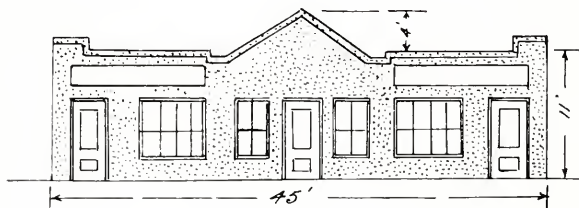
Basement with toilet, air compress and heating plant. Entrance to basement by steel winding stairway.

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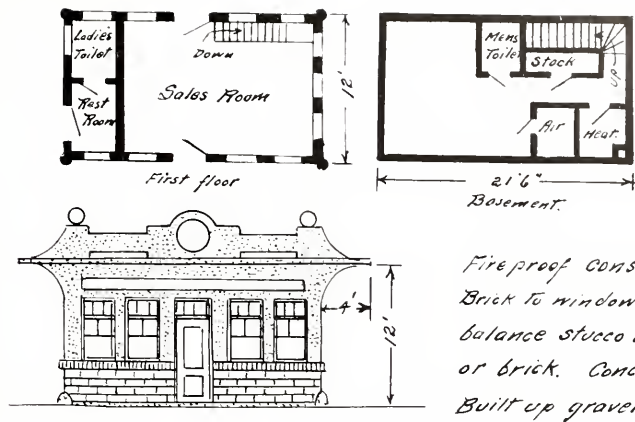




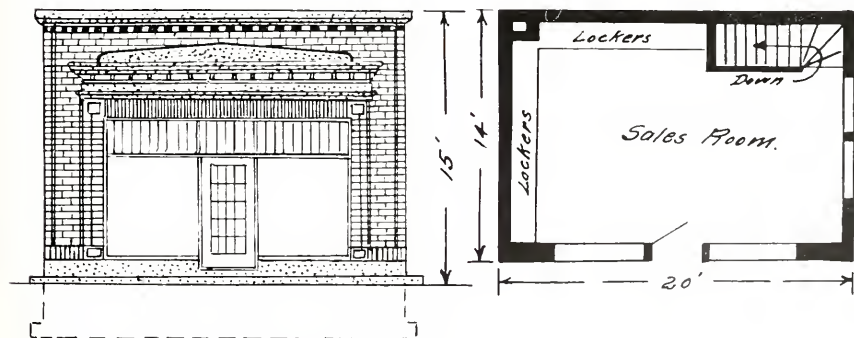
Frame building with
gray granite stucco veneer.
Plaster inside. Cement
floor. Prepared roofing.



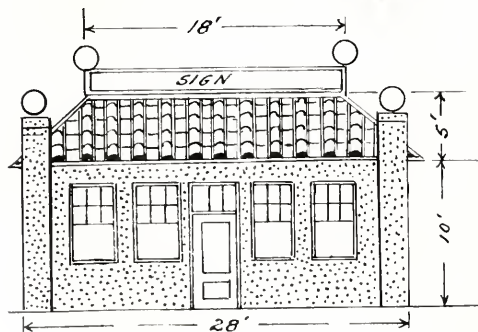
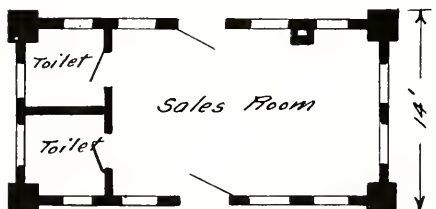
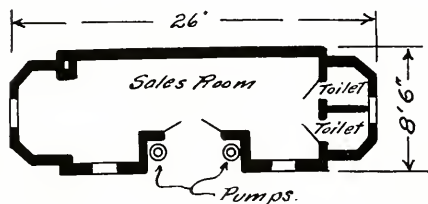
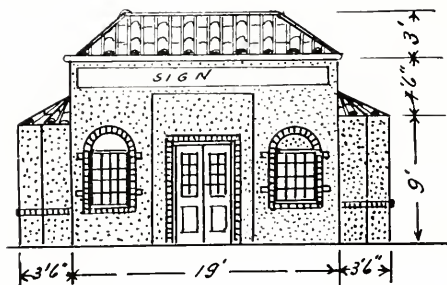
Building triangular in shape.
Hollow tile with stucco
finish. Plaster inside. Concrete
floor. Built up gravel roof.
No corner over driveway.



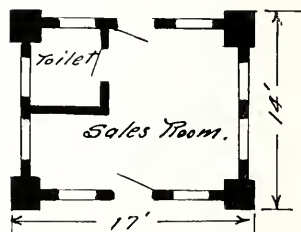
Fire proof construction -
Brick to window sill line,
balance stucco on hollow tile
or brick. Concrete floor.
Built up gravel roof.



Building of brick trimmed with concrete. Inside
of plaster with ornamental steel ceiling. - Concrete
roof. Floor of concrete with tile finish. Toilet, air com-
pressor and heating plant in basement. Printed by per-
mission of Automobile Journal Publishing Co, Pawtucket, R.I.



Fire proof. Brick unfinished inside. Cement outside, trimmings with wire cut brick. Concrete Floor and earthen tile roof.



For fire proof or semi fire proof construction. Brick or concrete with smooth finish or brick veneer. Cement floor. Tile or asbestos shingle roof.

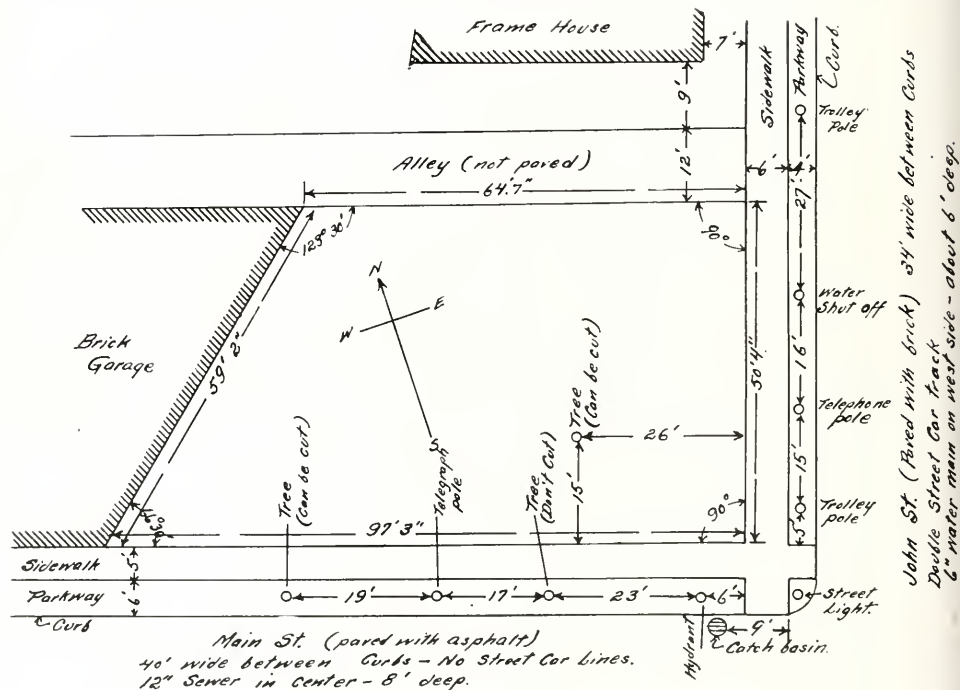
If you are considering the building of one or more Filling Stations, tear out this sheet, answer the questions and send to us with a sketch of your property.

We shall be glad to assist you by furnishing ground layout plans, detail plans of building suitable for construction, etc. If you have your own engineer or architect we shall be glad to look over their plans for the purpose of offering suggestions.

This branch of our engineering department is maintained solely for the purpose of serving you—please use it. It involves no fee or other obligation on your part.

1. Give plan of lot, showing its exact dimensions.
2. If corners are not right angles, show exact angle in degrees and minutes.
3. Is grade of lot above or below sidewalk or street and how much?
4. How wide are sidewalks?
5. What is width between sidewalk and curb?
6. How wide are streets between curbs and how paved?
7. Has it a single or double streetcar track?
8. Is street on heavy grade? How much and in what direction does it rise?
9. Is street traffic heavy? On which side is it heaviest?
10. Are abutting streets under jurisdiction of City Council, or under Department of Parks and Boulevards?
11. Is there a local ordinance governing width or number of driveway approaches?
12. Show location of sewer, and give its depth, size and direction of flow.
13. Show location of water main and give its depth and size.
14. Are there buildings on the adjoining property?
15. Give kind of construction, how used and their condition.
16. How close to property line and street line are they located?
17. Is it a business or residence district?
18. Are there any building restrictions on property?
19. Is property owned or leased? If leased, for what term of years?
20. Does lease contain a vacation clause?
21. Show on sketch of property, exact location of all trees, telegraph, telephone, electric light, trolley or guy poles, hydrants, fire boxes, catch basins, etc., that might interfere with location of building or proposed driveways.
22. Are there any trees or poles which cannot be cut or removed?
23. Is lot located within fire limit as described in ordinance?
24. Must building be either fireproof or semi-fire proof construction?
25. Will city ordinance permit of macadam pavement inside property line?
26. Will it permit fill boxes for tanks to be located at curb?
27. Does it limit the maximum storage or size of tanks, and if so, what is the limit?
28. Will more than one grade of gasoline be handled?
29. Will kerosene be handled, and how many grades of lubricating oil?
30. Would you consider storing lubricating oils under ground like gasoline?
31. Will accessories be handled and are window displays desirable?
32. Give estimated daily gallonage.
33. Must a room be provided for storage of stock, canned goods, etc.?
34. What kind of electric current and what voltage is obtainable?
35. Is free air and water to be furnished?
36. Can air compressors or motors be hooked up to light line?
37. Do local ordinances necessitate putting heating plant, motors, or air compressors in a separate room?

38. Will attendants be men or women?
39. Are one or two toilets desired?
40. Does ordinance regulate amount of floor space to be assigned toilets?
41. Will money be cared for by cash register, safe or how?
42. Is wall safe desirable and is money to be left in station at night?
43. Will trucks or passenger cars or both be served?
44. Will business be reasonably uniform thru the day or will there be rush-hour periods?
45. Should one or more driveways be covered, that is roofed over?
46. How is building to be heated and will this method conform to city ordinances relative to buildings in which volatile liquids are stored and handled?
47. Would you consider installation of a basement? Is it practicable?
48. What is maximum amount of money you can spend on station, including equipment, driveways, etc.?
49. What is the distance to the nearest competing station?
50. Is it paying? If not—Why?
51. Give us any other information concerning your proposed method of operation which will be of assistance to us in planning a layout best fitted for your needs.

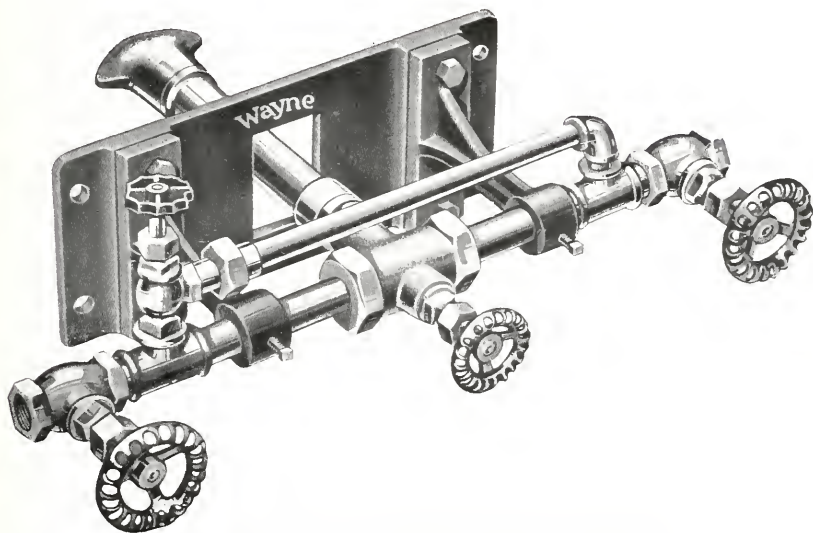


Sample Sketch showing how surveys of proposed filling station sites should be made.



Burning Fuel Oil and the Necessary Equipment

BULLETIN No. 2500



OIL BURNER FOR USE WITH POWER BOILERS

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

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Burning Fuel Oil and the Necessary Equipment

Many books and articles have been published lately on the use of oil as a fuel and the subject has received considerable attention with a view to its application to practically every condition where it is necessary to generate heat, such as the heating of homes, cooking of food, the melting, forging and heat treating of metals, firing power boilers, and other commercial operations.

A large majority of the articles on this subject have gone to some length in emphasizing the advantages of this fuel, but describing only certain parts of the equipment necessary to burn the oil properly, such as oil burners. Very little has been said, however, that would bring out the fact that it is just as difficult to burn oil properly and efficiently as it is to burn any other fuel efficiently—that in order to secure the most satisfactory results the many scientific principles involved must be applied in the design, construction and application of the necessary equipment, and in the construction of fire boxes or furnaces—that no one item of the system is more important than another. As a matter of fact, we might say that the oil burner is of minor importance though still an important item in the system.

Although oil is today probably the most extensively used fuel in industrial plants for the melting, forging and heat treating of metals, it is nevertheless often burned in a very indifferent manner and with varying degrees of inefficiency. Little regard also seems to have been given to safety. In most cases such conditions are due to the improper construction, selection, assembly, and installation of the various items entering into the oil burning system. In many cases each of these items are of excellent design and construction in themselves but have been improperly selected or installed and do not co-ordinate with each other.

It is also surprising that many installations are installed in such a manner that the lowest insurance rate cannot be secured and the greatest measure of safety is not afforded. It is as easy to burn oil with perfect safety as it is to burn it in a hazardous manner, but due to lack of knowledge of the subject and carelessness, improperly designed and installed systems have caused serious fires.

In the following we will pass rather lightly over the subject of oil as a fuel and apply ourselves more thoroughly to the matter of the necessary equipment to burn the oil properly and the installment of such equipment.

Fuel Oil

Crude Oil or Petroleum are the terms applied to oil in its native or raw state as it flows, or is pumped, from the wells. This oil either has a paraffine or asphaltum base, depending on the location of the oil fields from which it comes.

Crude oil of either base makes an excellent fuel when burned in its crude state; but with the pos-

sible exception of the heavy Mexican oils, it is first distilled in order to secure the gasoline, kerosene, etc., which it contains. The residue is known as "fuel oil," and that is what the oil companies usually supply for fuel purposes. It has been found practical to distill to only a slight degree most of the Mexican crude oils and therefore they are often sold in their native state for fuel purposes.

The heavier fuel oils usually possess greater heating value, or contain more B. T. U. (British thermal units), or heat units, per gallon, but due to their high viscosity are somewhat more difficult to burn than the lighter oils. However, due to the increasing demand for gasoline and due to improvements in refining methods during the last few years, it is almost impossible to obtain any but the heavier oils for burning purposes at the present time.

Uses of Fuel Oil

Oil is by no means a new fuel. For a great many years it has been used in foundries and industrial plants for the melting of metals, forging of all kinds, and for the case hardening, annealing, and general heat treatment of steel. In fact, it is today probably the most extensively used fuel throughout the country for these purposes.

For a great many years oil has also been used extensively on the Pacific coast and throughout the Southwest for firing power boilers and railroad locomotives. In the large cities, hotels and clubs even use this fuel for cooking food as well as for heating and power purposes. There are also a large number of satisfactory installations in that part of the country for heating private homes.

During the last few years the use of fuel oil for power and heating purposes has become prevalent throughout the New England states. The large number of such installations throughout that section of the country testified to the satisfaction that this fuel is giving. At the present time there are also many highly satisfied users of fuel oil for large power boilers within and near New York City.

The United States Navy, the navies of most of the other great sea powers, and many commercial steamers, have been large users of fuel oil for a number of years, and the adoption of this fuel for all classes of war vessels seems to be the present policy of our government.

It will be noted from the above that although the use of fuel oil for industrial furnaces and operations is general throughout the country, its use is not general for heating power boilers, domestic furnaces, and cooking, except in those sections of the country where oil is comparatively cheap and coal expensive. From this it seems that where high, intense temperatures are necessary, oil fuel shows to better advantage than coal, whereas the reverse is true when comparatively low temperatures are required.

Following is a list of industries, operations, and processes of manufacture where fuel oil has been advantageously used for a number of years:

- Agricultural Implements
- Assaying
- Automobile Parts and Accessories
- Bolts and Screws
- Brass Melting
- Cement Industry
- Chemical Works
- Cooking Food
- Clay Industries
- Cutlery Manufacturing
- Domestic House Heating
- Drop Forging
- Enameling
- Forging
- Glass Making
- Heat Treating of Steel
- Hardware and Sporting Goods
- Lime Burning
- Locomotive Firing
- Metal Melting
- Open Hearth Steel Furnaces
- Oven Heating
- Power Boilers
- Rivet Heating
- Rubber Industries
- Soldering Iron Heating
- Smelting Furnaces
- Silverware and Cutlery
- Sugar Plants
- Tool and Machinery Manufacturing
- Type Metal Melting
- Vehicle and Carriage Manufacturing
- Welding.

Advantages

It is difficult to separate the advantages of fuel oil from the question of cost. Although fuel oil has many distinct advantages, the value of these advantages must be carefully weighed against the cost of the various fuels themselves. Principal of the points in favor of oil fuel are the facts that it is handled with a minimum of labor and dirt, and automatically delivered to the point where burned. The temperature is controlled by simply the turning of valves. Labor costs and troubles are reduced to a minimum by the elimination of the handling of coal and ashes.

To walk through a boiler room equipped with a proper oil burning system is a distinct pleasure to anyone interested in the matter. The room is clean and neat, no coal and ashes on the floor nor their dust in the air, doors are not continually opened, and the fireman is pleased with his "job."

On shipboard a considerable saving is secured by the reduction of space required for storing oil as compared to coal, as it requires about one-third less storage space for the same number of heat units and weighs about half as much. It also does not deteriorate in storage as is the case with coal. The ease, freedom from coal dust, and rapidity with

which the oil supply is loaded, are also distinct advantages.

Another valuable advantage (TO THE NAVY ONLY) in the use of oil fuel is the ability to promptly and easily throw a smoke screen by simply feeding an excess of oil through the burners; or, under other conditions, to run at full speed without showing any trace of smoke. It is also possible to press the boilers when great and continued speed is necessary, far beyond the point that would be possible with coal and with no strain on the boiler room force.

In certain stationary power plants a very large volume of steam is required for only a few hours a day and with coal fuel it is often necessary to blow off the boilers as soon as the peak load has been passed. This is really simply "blowing off" profits. With oil it is usually only necessary to shut off the burners, leaving nothing to burn in the fire box, and the consumption of fuel and development of heat is thereby stopped immediately.

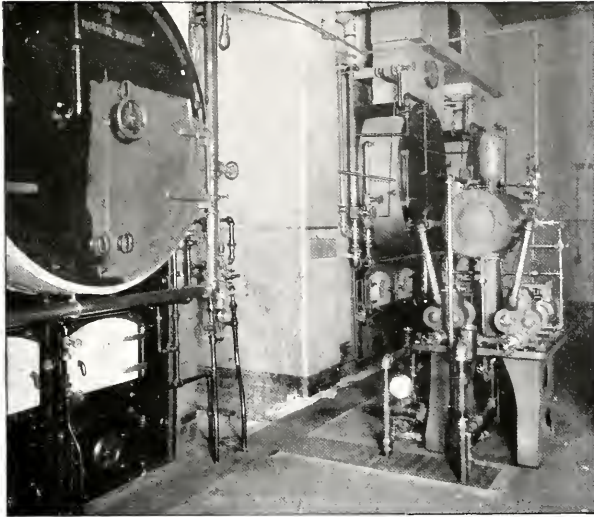
With regard to the burning of oil in metal melting, forging, and heat treating furnaces, oil has proved to be a very satisfactory and economical fuel. Production is increased due to the uniform and even temperature throughout working hours. These temperatures are easily and accurately maintained, quickly increased or decreased at will by simply turning the proper valves. In fact in all industrial operations where this fuel is used less work is spoiled, less raw material is lost and better products are usually the result.

Cost Compared to Other Fuels

In figuring the comparative cost of the various fuels the B. T. U. (British thermal unit) value of each fuel should be the basis of our calculations. It is impossible to state definitely the heat value of any particular fuel such as oil, coal, or gas, as the same kind of fuel will vary considerably, depending upon its grade, the district from which it comes, its manufacture, etc. However, for preliminary estimating purposes, the figures given in the table on page 17 have proven to be sufficiently accurate.

When basing our calculations on the B. T. U. values of the different fuels given in this table it will be seen that approximately 180 gallons of oil are equivalent to 1 ton of average coal. However, in actual practice, it has been found that in small forges and industrial furnaces of that type, 50 gallons of oil will produce the same amount of work as a ton of coal. On the other hand, with power boilers, 150 gallons are sometimes required to do the same amount of work as 1 ton of coal. In the majority of installations for metal melting, forging, or heat treating, 100 gallons of oil have proved to be equal to a ton of coal.

As compared to gas, it will be seen that approximately 4.2 gallons of oil are equivalent to 1,000 cubic feet of average public illuminating gas, and 7 gallons of oil are equivalent to 1,000 cubic feet of average natural gas. This theoretical comparison also works out on this basis in actual practice



Typical Fuel Oil Burning Boiler Installation

with furnaces of equal size and each properly designed for the fuel used.

Of late years electric furnaces for melting and heating have been developed to a high state of efficiency, but it will be seen that approximately 42 K. W. H. of electricity are required to equal the heating value of one gallon of oil. However, electric furnaces are often rated as 100% efficient, which is obviously unfair, while oil or gas burning furnaces are usually rated at 50% to 75% efficient. For an average, if we base our figures on electric furnaces as 85% efficient and oil burning furnaces as 60% efficient, we still find that approximately 30 K. W. H. of electricity are required to produce the same results as one gallon of fuel oil.

Labor Costs

In the larger installations, the cost of handling oil is a great deal less than the cost of handling coal and ashes. Where furnaces only are used, it is simply necessary to have some one to supervise the filling of the storage tanks and keep the blowers, etc., in proper order. Even in the largest installations this requires only a few hours a month. There need be no special men to take care of the fires and carry coal and ashes. However, in applying fuel oil to power boilers the possible saving in labor can only be taken into consideration on large installations of many boilers where the substitution of this fuel would materially decrease the boiler room force. One man would be necessary to take care of one or two boilers with either fuel, and therefore in such a case no saving could be made in labor.

From the above it will be noted that at the present market prices the actual cost of oil is less than the cost of coal in industrial furnaces, and the cost of oil is usually higher than coal for firing power boilers, except in such sections as the Pacific and Atlantic coasts. However, the efficiency of the steam boiler is often increased 10% by the use of oil. On a recent test conducted in a very practical and scientific manner on some 400 H. P. boilers it was shown in this case that the greatest boiler efficiency possible with coal was 60%, whereas with oil a boiler efficiency of over 70% was obtained. The writer was also recently advised by an engineer operating a very large power plant in New Jersey, and who had been burning Mexican fuel oil under his boilers for over a year, that the actual cost of oil alone had been less than the previous cost of coal and in addition to this saving he had been able to practically cut his boiler room force in half.

Summary

In summing up the advantages and comparative costs of the different fuels, it will be appreciated that it is impossible to set down any definite figures on comparative costs and possible savings that could be applied to all prospective installations, as in each individual case conditions will vary in many particulars. It is possible, however, by using good common sense and simple arithmetic, to estimate very closely, after collecting all the data available, just what can be accomplished. It is seldom necessary to run any kind of test, as, if the calculations have been carefully carried out, and if

the proper oil burning equipment is selected and properly installed, these calculations will work out very closely in actual practice.

In each particular case the situation must be carefully studied, taking into consideration the B. T. U. value of each fuel, the source and dependability of its supply, the delivery cost of the fuel, the cost of each fuel itself, the possible saving in the cost of handling the fuel and ashes, greater efficiency of boilers or furnaces, saving in labor of maintaining fires, saving by increased production, saving in percentage of work spoiled or raw material lost, etc. Against all of these possible savings the cost of converting present installations to oil burning must be balanced. It will be found, however, that in most new installations, the first cost of the necessary equipment for burning oil will be less than the cost of equipment for burning coal efficiently.

When we have concluded that oil will prove the most satisfactory fuel, it is then very important that the question of a proper oil burning system be given our most careful consideration. Lack of care and proper consideration in this respect have often caused considerable financial loss and made useless the most careful calculations.

The Oil Burning System

The burning of oil has not been free from the waste and inefficiency prevalent in this country in the use of almost all raw materials. We feel it safe to say that the majority of oil burning installations are being operated far below the percentage of efficiency that is possible with this fuel, due to improperly selected and installed equipment.

If we are to secure the most efficient and satisfactory results, the equipment necessary to burn oil properly must be considered as a unit—one complete system; and each item of the complete system must be specially designed for the purpose, and selected and installed accordingly. In fact, every item must fit, or co-ordinate, with every other item.

It is quite an engineering problem to assemble and install a complete oil burning system, as many scientific principles are involved and must be applied. This work should only be placed in the hands of those who are practically and technically qualified to undertake it.

A complete oil burning system consists principally of the following items: (a) the furnace or combustion chamber where the oil burns and where the heat that is generated is used; (b) the oil burner which atomizes the oil and projects it into the furnace in the form of a finely atomized spray; (c) the oil pump which supplies oil to the burners; (d) the oil storage tank, or tanks; (e) the air compressors, or blowers (when required) for furnishing air for combustion and atomizing the oil at the burner; and certain special fittings and accessories. However, the means of supplying oil, and air, or steam when necessary, to the burner, is the part of the equipment usually referred to as "The Oil Burning System."

The most essential points in an oil burning system are the following:

(1) That it supply oil in sufficient volume to the burner in a clean and properly heated condition, and under a constant and automatically regulated pressure, **free from pulsations.**

(2) That it supply air in sufficient volume to the burners (when of that type) in a clean and fresh condition, and under a constant and automatically regulated pressure, **free from pulsations.**

(3) That it supply steam to the burners (when of that type) in a dry, hot state, and under sufficient pressure.

(4) That the air and oil supply be connected, or co-ordinated, in some way so that should the air supply fail, the oil supply will be instantly cut off.

The burning of oil is in reality the continuous feeding of two ingredients (oil and air) in proper proportion into the combustion chamber in such a manner that a chemical mixture will be secured and good combustion will be the result. It will be appreciated that whenever the oil or air pressures are not constant, or pulsate, it is impossible to secure good combustion. In short, whenever the oil or air supply pulsates, it is safe to say that just 50% of the time good combustion is not obtained. The pressures of oil and air must also be automatically regulated; or otherwise, whenever a burner is started up or shut down it will be necessary to adjust all of the other burners in the system. It will also be appreciated that when wet steam is fed to a burner an excess of oil must be burned to overcome the cooling effect of this water and convert it into steam.

Whether or not good combustion is being secured can only be determined by analyzing the flue gases. However, when a red, smoky flame is produced it is evident that an excess of oil is being burned. On the other hand, when the flame is intensely white and sharp, an excess of air is usually the cause. It must be possible with an oil burning system to obtain sufficient heat, and properly regulate the combustion, by simply turning the valves in the oil and air supply lines, or adjusting the air damper so that neither a smoky, red fire nor an intensely white, sharp flame is produced. In firing steam boilers the best results are obtained when a slight haze is seen coming from the stack.

In systems used in connection with industrial furnaces it has been found that when the air pressure fails, and the oil continues to discharge into a hot furnace, the flame blazes up to the roof of the building, which has caused some bad fires. Therefore it is of a great deal of importance that there be some connection between these two sources of supply, so that they start and stop simultaneously.

Oil Burning Systems may be roughly classified into three distinct types—Mechanical Systems, High Pressure Systems, Low Pressure Systems.

Mechanical Systems supply oil under a high pressure to mechanical types of burners where no compressed air or steam is used for atomizing the oil.

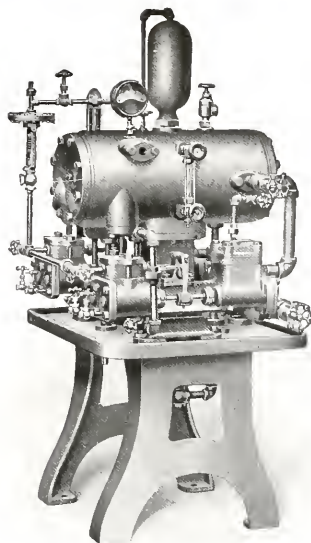
This system is of less general interest in that it has only proved to be advantageous on shipboard. The type of burner used depends on the construction of its tip and the pressure on the oil to project the oil in the form of a finely atomized spray into the combustion chamber. As such a system comprises very little equipment and requires no steam for atomization, it is obvious that its greatest advantage is the saving of fresh water—an important consideration on shipboard. However, due to the extremely high pressure under which the oil must be fed, etc., many steam vessels have not adopted this type of system and on land other types of systems have proved to possess greater advantages.

High Pressure Systems supply oil and steam (or air) to burners under high pressure. (Over two pounds per square inch.) Such systems are most generally used for firing power boilers. A typical installation of such a system is illustrated and described in Bulletin No. 2560. In this system the oil is atomized by means of steam supplied from the boiler with which the burner is operating. The air for combustion is taken in by natural draft through the ash door. The oil is drawn from the storage tank and discharged to the burners by means of the oil pumping, heating and regulating system illustrated and described in Bulletin No. 4040.

Compressed air may be used in place of steam for atomizing, but, as in properly installed systems, only about 2% of the steam generated is used for this purpose, the use of compressed air has been found uneconomical for continuous operation.

In the past, high pressure oil burning systems, using air under high pressure, instead of steam for atomizing the oil, have also been used to fire industrial furnaces. These systems usually consist of high pressure type oil burners, piston type air compressors, duplex piston type oil pumps, driven by air instead of steam from the compressor, and the necessary special fittings, etc. However, experience has shown that the cost of compressing air to such a high pressure (100 lbs.) is approximately 10 times the cost of compressing the same volume of air but under a lower pressure (1½ lbs.) as used in low pressure systems. Just as efficient results have also been obtained with the low pressure system. Therefore the use of high pressure type oil burning systems for industrial furnaces has been almost universally discontinued.

Low Pressure Systems supply oil and air to burners under low pressure. (Two lbs. or less of air and five lbs. or less of oil.) Such systems have been found to be the most efficient and advantageous for use with industrial furnaces, heating low pressure steam boilers, cook stoves, etc. Typical installations of these systems are illustrated and described in Bulletin No. 2520. These systems consist principally of a compressor, or blower, for furnishing the necessary air in sufficient volume for combustion and under sufficient pressure to atomize the oil at the burner tip; an oil pump for drawing the oil from the tank and discharging it to the



**Fuel Oil Pumping, Heating and Regulating System
For Use in Heating Power Boilers**

burners; and such special fittings as air chamber, air receiver, oil and air relief valves, pressure gauges, etc.

Systems where the oil is fed to the burners by gravity from an overhead storage tank, or from stand pipes, as well as systems where the oil is forced to the burners by means of compressed air on the oil in the tank, are all dangerous and their use is seldom approved by the insurance companies.

In the rare cases where a piston type of air compressor is used for supplying air to oil burners, it is advisable to supply the oil to these burners by means of a small duplex piston steam pump. This pump can be run by compressed air from the air compressor in place of steam. In this way the two units will be co-ordinated and start and stop together.

Installation of Oil Burning Systems

The proper installation of an oil burning system is of as great importance as the selection and construction of the necessary equipment.

In order to avoid fire danger, secure the lowest insurance rates, and obtain the largest possible degree of efficiency, this problem should be handled from an engineering standpoint and definite scientific principles applied.

OIL PIPE:

The proper size of suction and discharge pipe



Fuel Oil Heater

should be calculated so as to decrease as much as possible the loss of pressure due to friction in the pipes. Elbows should be avoided wherever possible. Foot valves should be installed at the end of the suction line so as to avoid the necessity of priming the pump. A pipe line strainer in duplicate should always be installed in the suction line.

Only the best grade of pipe, fittings, and valves should be used.

AIR PIPE:

The proper sizes of air pipe should also be given very careful consideration and scientifically figured. It is advisable to draw clean, fresh air from out of doors if possible, which will aid in combustion and prevent the blower from becoming filled with dirt. The air pipe should never be smaller than the connections on the compressor or blower; and when the air is to be carried some distance this pipe should often be larger, being reduced right at the air compressor connections.

In large low pressure installations, where exceptionally large air pipe is required, spiral riveted, or welded, sheet steel pipe is more economical than wrought iron pipe and is as satisfactory. Elbows and sharp bends should be avoided as much as possible. This is especially true where centrifugal, turbo, or fan types of compressors are used. Gate type valves, or cocks, should be used.

It is advisable to install a valve or cock, a union, and a special swing check valve in the branch lines to each oil burner, so that any burner may be disconnected without shutting down the entire system. The check valve acts as a fire arrester.

PIPE JOINTS:

All oil pipe joints should be carefully cut and

threaded and made up with a mixture of litharge and glycerine, which should be applied to the male end of the connection. Red lead, or white lead, should never be used. The air pipe, however, can be fitted up with red or white lead. Each leak in an air line might be small, but a number of such leaks greatly reduces the volume of air available.

All oil and air pipe should be installed to allow for the addition of a reasonable increase in the number of oil burners or furnaces.

FILL PIPE:

When the storage tank is to be filled from barrels or tank wagons, a two-inch watertight fill box can be installed directly over the tank. This fill pipe can also be used for dropping a gauge stick into the tank. However, whenever the tank is to be filled from tank cars by gravity, a three-inch or four-inch pipe line should be run from the tank car to as close to the railroad siding as possible. The end of this line should be fitted with a pipe line strainer, a hose connection nipple with cap and chain, and a cast iron lock cover box. A ten-foot length of three-inch metallic hose should be used for connecting the tank car with the fill pipe.

A tank car connection fitting should be used for connecting the hose with the tank car connection.

If the storage tanks are placed above ground and above the tank cars, a power pump must be used for unloading purposes. This pump should have a capacity of at least 100 gallons per minute.

All tanks should be connected with a vent line running from the tank to above the roof of the nearest building, and should be capped with a weatherproof vent protector fitted with fire screens. On the tanks below 1,000 gallons capacity a one-inch vent line is sufficient. Larger tanks should be fitted with a 1½-inch vent line.

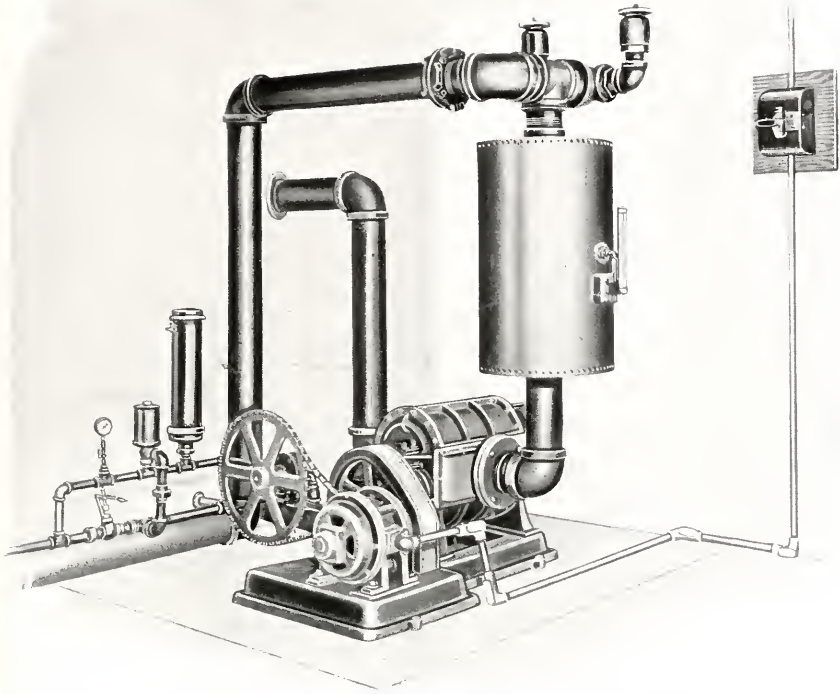
A ½-inch pipe line is sufficient for the tank galvanometer indicator.

All storage tanks should be placed horizontally underground so that the top of the shell is not less than two feet below ground. However, the tank should not be placed too far underground or the suction lift from the bottom of the tank will be too great. The bottom of the tank should not be more than 14 feet below the pump level.

Where the bed rock is near the surface of the ground, the tank should be anchored to this bed rock by means of straps over the top of the tank. Also, when the tank is installed in wet ground it should be placed on a concrete foundation and anchored to this foundation. If this is not done in either of the above cases the tank will work out of the ground of its own accord and break all pipe connections.

Storage tanks should not be installed in vaults. Oil gas is heavier than air and so these vaults become filled with a poisonous and explosive gas.

Never enter a used oil tank through the manhole or attempt to make any repairs on it until it has been thoroughly steamed out; or better still, flooded with water.



Typical Installation of Low Pressure Type Oil Burning System

Heating Oils

Many heavy oils which make excellent fuels cannot be burned or pumped unless they are heated to a temperature often as high as 150 degrees in order to reduce their viscosity. As stated above, all fuel oil tanks should be fitted with steam coils. When heavy oils are to be burned, all oil pipe lines should also be closely paralleled with steam lines. These steam lines should be run as close as possible to the burner connections. The steam and oil pipes should either be wrapped together or run together through a soil pipe to avoid loss of heat.

Special oil heaters only heat the oil at a certain point and are only advisable when the rate of flow is comparatively high, as in firing power boilers or where exceptionally heavy oil or tar is the fuel. As the rate of flow is usually very slow it will be

seen that a great deal of heat is lost when long runs are necessary after the oil leaves the heater and before it reaches the burners. On the other hand, by paralleling the oil pipes with steam lines, the oil is kept constantly hot from the storage tank to the burners. Great care should be taken not to heat the oil above its vaporizing point.

When heavy oils are used the system should be drained whenever the plant is shut down to avoid the solidifying of the oil in the pipes and difficulty in starting up the system.

Automatic Cut-Off Valves

Automatic Cut-Off Valves should always be used for connecting the oil and air supply lines so that the flow of oil will be shut off when the air pressure fails or for stopping the flow if the oil pipe is fractured.



Tilting Crucible Type Brass Melting Furnace

Oil Burning Equipment

It will be appreciated that the various items mentioned in the previous description of systems are all articles of standard make. However, each of these items must be specially constructed and fitted with certain accessories properly selected and co-ordinated, if the most efficient results are to be secured. We will therefore describe in detail the most important attributes of this equipment.

FURNACES:

Each fuel, such as oil, gas, coal, wood, etc., requires a different type of combustion chamber. This is due to the variation in the physical form of the different fuels as well as the variation in time required for each fuel to be converted into combustible gases.

A furnace designed for use with a certain fuel cannot be used to advantage with any other fuel unless proper alterations are made in the combustion chamber. Often these changes are impossible without entirely rebuilding the furnace and in most cases it is most economical to install an entirely new furnace.

Sometimes an oil burning furnace is referred to as simply "a box of iron lined with fire brick with a hole in the middle." Too often many furnaces are just this, and it is even possible to heat metal

in such furnaces. However, the design of an efficient furnace is based on definite scientific principles covering the size of the combustion chamber and the number of cubic inches of space to be evenly heated at a certain temperature; the size, number and position of the burner holes; the number, area and position of the vent ports, etc. In order to secure the maximum of life under hard usage, the construction of the furnace must be correct. The steel or iron shell must be capable of withstanding the expansion and contraction of the lining, and this fire clay lining must be of proper grade and thickness for the work to be done.

The size and the type of furnace to be selected is a matter that must be given very careful consideration. The furnace should be neither too small nor too large for the work. Your calculations should be based on the quantity of metal to be melted at one heat, or the size of the piece to be forged or heat treated, and the speed of production desired. Although the first cost is higher, several small furnaces are sometimes more efficient than one large furnace.

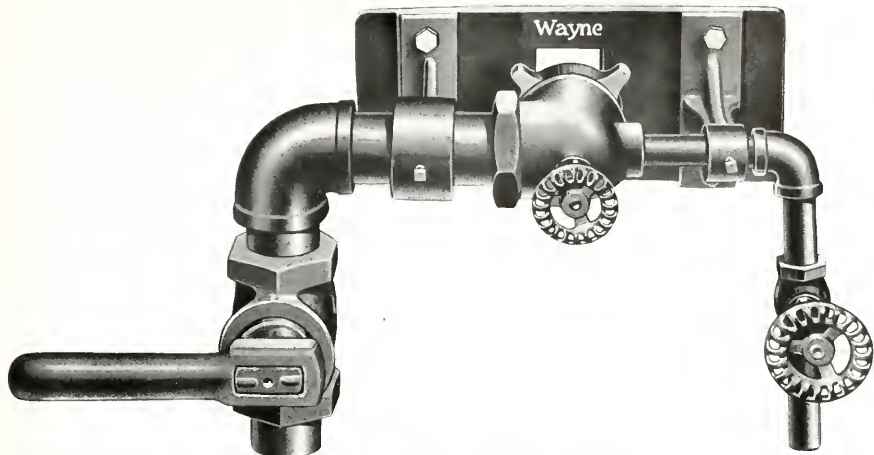
It is very bad practice to attempt to use one furnace for different kinds of work where there is a material difference in the heat required.

BURNERS:

Many claims are made for the thousands of oil burners on the market and the savings that can be made by the use of various devices, etc. However, considering that the furnace is properly constructed, all other conditions being correct, when you have secured all the heat that you require with perfect combustion, your burner is doing all that can be done, as no burner or device will enable you to get more heat out of the oil than the number of heat units, or B. T. U., which the oil contains.

The oil burner must also be of the proper size and type for the furnace for which it is to be used. A good oil burner can be easily constructed of pipe and pipe fittings by one who knows how, but this burner would be constructed differently in practically every case. Therefore, it is just about as foolish to experiment with different makes of burners to find the one best suited for the work as it would be to experiment with different kinds of electric currents to find one which would drive a certain standard motor built for a standard electric current. The right current, and only the right current, will drive the motor. A burner designed for use with certain pressures of air and oil will give entirely different results when the pressures are varied or changed, and may not operate at all.

Some people find that sufficient heat cannot be obtained unless the oil is fed to the burner under a very high pressure—ten to eighty pounds per square inch. This trouble is due to the faulty construction or design of the burner. Such high pressures are only necessary with the mechanical type



Low Pressure Air, Adjustable Type Oil Burner

of burner where no air or steam is used for atomizing, and which are not practical for industrial installations, and with high pressure burners applied to large power boilers where a very large quantity of oil must be fed through as few burners as possible. With a properly designed low pressure burner it is only necessary to feed the oil to the burner at a pressure of about five pounds per square inch, sufficient to enable the oil to flow through the burner in a constant and steady stream. A high pressure oil system is, of course, a great deal more troublesome and uneconomical than a low pressure system. In fact it is as foolish to state that high oil pressure is necessary to obtain a high heat as it would be to state that the harder you throw coal in the stove the hotter the fire will be.

A disadvantage with high pressure oil is that the needle valve in the burner must be closed to a very small orifice in order to prevent too much oil from entering the furnace. Small particles of dirt which are not caught by the pipe line strainer easily clog up this small opening. On the other hand, with a low pressure, the valve can be opened wider and any particles of dirt passed by the strainer will also pass out through the burner.

There is also a great deal of confusion regarding the pressure of air necessary to properly atomize fuel oil. Some claim that five to eighty pounds pressure are necessary. However, in the majority of installations even the heaviest oils can be burned with perfect combustion using an air pressure of not more than $1\frac{1}{2}$ to 2 pounds per square inch. Of course the burner must be specially designed. For years a certain well known manufacturer has been burning heavy oil with perfect combustion for forging and welding purposes and using an air

pressure of not over eight or ten ounces. Of course it must be understood that a burner designed for high pressure air cannot be operated with a low pressure supply and the same results obtained as with the high pressure air. The burner must be designed for the particular air pressure which is to be used, and this air pressure cannot be varied.

When oil burners are used to fire steam boilers, dry steam is most generally used in place of air for atomizing the oil. It is impractical to use steam for atomizing when the burners are applied to industrial furnaces due to the difficulty of maintaining dry steam at so great a distance from the boilers, and the high cost of this atomizing agent.

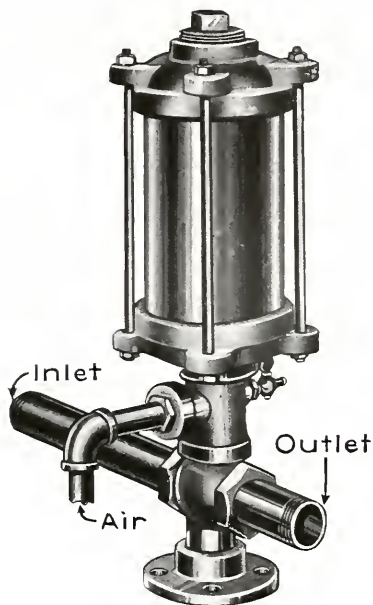
Oil Burners used for firing power boilers, industrial furnaces with high pressure air, and industrial furnaces with low pressure air all vary considerably in their design and construction. One type of burner cannot be used for all purposes.

It is also advisable to have a selection of several different sizes of each type of burner. In this way one or two large burners may be used with a large furnace and a small burner with a small furnace. With only one size of burner, suitable for a small furnace, it is necessary to use a large number of such burners on a large furnace which require a great deal more time to regulate than one or two large burners.

The size of burner selected should be neither too large nor too small for the work to be accomplished.

AIR COMPRESSORS AND BLOWERS:

It must be remembered in burning oil that volume of air is what is required, the pressure being of less importance. In other words, a definite number of cubic feet of air are required to properly burn a gallon of oil. This air is simply fed to the burner under sufficient pressure to atomize the oil



Automatic Cut-Off Valve

at the burner and inject the oil spray into the furnace. Naturally the size, or capacity, of the air compressor depends entirely on the number of gallons of oil that are to be burned in a definite time. The style or type of compressor is also dependent upon the class of work to be done, or upon shop conditions.

Where the load on the compressor varies during the day, or from day to day, the turbo type of compressor is the most economical. This compressor delivers air at a constant and steady pressure of one and one-half pounds per square inch; but the horsepower consumed in driving the machine is in proportion to the volume of air consumed at the burners. In this way, when a number of the furnaces are not in operation, or the burners partly shut down, the cost of running the compressor is considerably reduced.

The fan type compressor, or blower, when either belt driven or direct connected with an electric motor, has the same characteristics as the turbo type with regard to the power consumption, but will not deliver air at a much greater pressure than eight to twelve ounces.

The turbo, centrifugal, and fan types of blowers are particularly well suited to oil burning, as, if properly designed, they do not produce pulsations in the flow of air and the pressure is constant regardless of the volume of air being consumed.

This obviates the necessity of special air receivers and relief valves.

The rotary or positive pressure type of compressor will deliver a large volume of air under a pressure of one to two pounds per square inch, but the horsepower consumed in driving this machine is constant. When the full capacity of this machine is not consumed the excess air must escape through relief or safety valves, and of course air so escaping is a total loss. Therefore, this type of machine should only be used when the demand upon it is constant.

All but the very small sizes of rotary air compressors should be fitted with a special air receiver which, when properly designed, removes all pulsations from the flow of air. This air receiver is not simply a hollow cylinder.

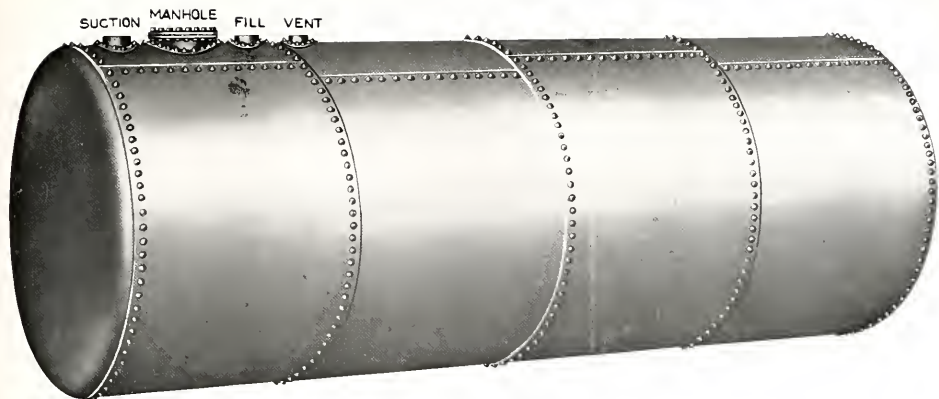
All rotary or positive pressure types of blowers should be fitted with weighted type, non-vibrating relief valves of sufficient size to vent the entire capacity of the machine. In this way a constant and uniform pressure is automatically obtained at all of the burners whether one or a dozen burners are in operation at the time.

At the present time few of the piston types of air compressors are used for oil burning. These machines are usually operated to produce a pressure of 5 to 125 pounds per square inch, but their capacity in volume of cubic feet of air is comparatively small and the cost of operation for this purpose is excessive. In one installation where a machine of this type had been used for oil burning for a number of years, it was found that the cost of the compressed air was as high as the cost of the oil which they were burning—practically fifteen times the cost of using a low pressure machine.

In selecting a compressor, care should be used in selecting one of sufficient capacity to take care of a reasonable growth in the production.

OIL PUMPS:

As only about five pounds pressure of oil are necessary for operating industrial furnaces, the small impeller type of pump is best for this service. The smallest standard sizes of these pumps supply 300 to 600 gallons per hour, which is considerably more than the amount usually required. The pump should be fitted with an air chamber, weighted type relief valve, and pressure gauge. When the air chamber is properly constructed, all pulsations are removed from the flow of oil. The relief valve is used to carry off the excess of oil which the pump supplies or which results when only a few of the number of burners which it feeds are in use. When this relief valve is properly constructed the pressure of oil at each burner will remain constant whether one or fifty burners are in operation. It is difficult to set a spring type of relief valve at so low a pressure, and as the volume of oil which this valve passes is increased the spring is compressed, which results in the pressure at the burners being increased. Therefore, with a spring type of relief valve, the oil burners must each be regulated when



Fuel Oil Storage Tank

ever one or more burners are shut down or started up. A spring relief valve is also inclined to chatter, resulting in pulsations at the burner.

Of course, when it is necessary to operate the pump at pressures of thirty pounds or more, the triplex plunger type, or duplex piston type of pump must be used.

STORAGE TANKS:

Too great care cannot be used in the selection of the oil storage tank, or tanks. It is a great deal more difficult to construct an oil tight tank than to construct a tank simply for the storage of water. It is very difficult, and sometimes impossible, to repair a leaking tank, and a great deal of oil may be lost before the leak is discovered. All tanks should be inspected and labeled by the Underwriters' Laboratories of the National Board of Fire Underwriters.

Fuel oil storage tanks should be cylindrical in shape and placed underground so that the top of the shell is at least two feet below ground. These tanks should be of sufficient capacity to allow a working supply in case deliveries are delayed, and so that tank cars can be entirely emptied as soon as they are received, avoiding demurrage charges. Where shipments are to be received in single car-load lots, a 12,000 gallon tank is the smallest size that should be installed. However, many installations embody two or more tanks varying in capacities from 8,000 to 25,000 gallons.

It should be specified that the tank be fitted with all of the pipe flanges and the manhole at one end of the shell on top. In this way it is possible to build a box with a trap door over one end of the tank whereby all pipe connections and the manhole may be easily gotten at.

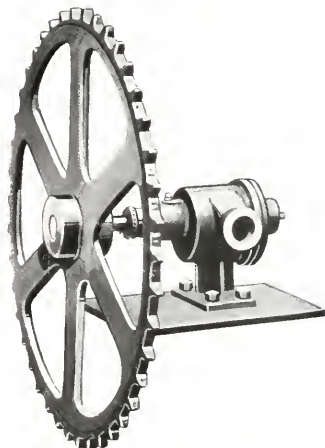
It is good practice to fit a fuel oil tank with the following flanges and manhole: One 10"x16" manhole, one 31 $\frac{1}{2}$ " suction flange, one 4" fill flange, one

11 $\frac{1}{2}$ " vent flange, one 11 $\frac{1}{2}$ " return pipe flange, and one 1 $\frac{1}{2}$ " indicator flange.

Every fuel oil tank should be constructed with internal steam coils of proper design. Although it might be possible to obtain a light oil at the time the tank is installed, it may become necessary at any time to burn a heavy oil, which would require heating.

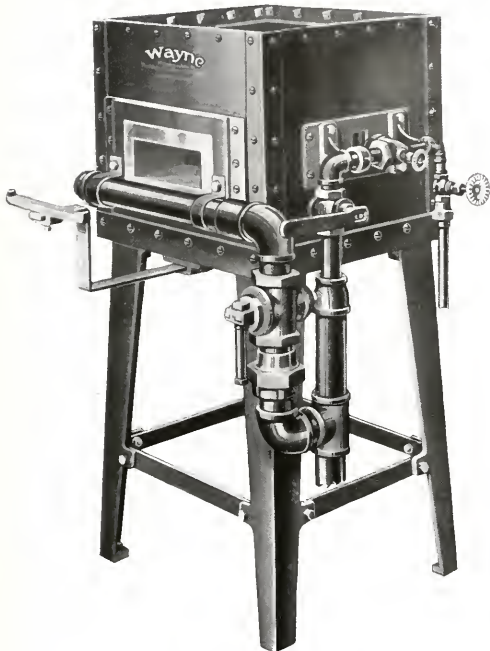
TANK GALLONAGE INDICATORS:

Each storage tank should be fitted with a tank gallonage indicator. These indicators show at a glance the contents of the tank. They may be placed inside of the nearest building, outside of the building against the wall, directly over the tank, or on the side of above-ground tanks.



Impeller Type Fuel Oil Pump

Forge Type Furnace



Case Hardening

When a piece of metal is case hardened, a case or film of hardened metal is formed on the outside over a core of softer and tougher material.

The steel to be case hardened is usually packed in a cast iron box with some carbonaceous material as bones, leather, charcoal, etc. The box is filled with alternate layers of pieces to be hardened and packing material, being sure that the bottom, top and sides of the box do not come in contact with pieces to be hardened and the pieces themselves do not touch. The box is then tightly sealed and placed in the oven. The oven is brought to a temperature of 1600° F. to 1800° F. and held at this heat for the desired time. The length of time depends on depth of case desired. The box is then removed from the oven and allowed to cool. The pieces are then taken out and reheated to about 1450° F. and quenched in water or oil.

Hardening

In hardening steel, the piece is brought to a high temperature and quickly cooled in an oil or water bath. The degree of hardness varies with the degree of cooling. The temperature that the steel is brought to before quenching depends on the kind of steel and the use to which the hardened piece is to be put.

Care should be taken not to overheat or heat the

steel too quick, as either case will spoil the texture of the steel for heavy duty.

Annealing

After a piece has been forged, it is best practice to anneal it in order to remove hardness, strains and reduce the risk of cracking when hardened.

Annealing should be done by uniform slow heating and slow cooling. Temperature required varies from 1350° F. to 1700° F., depending upon the metal to be annealed.

When steel has been annealed, it is soft and tough and is in its best state to be hardened. Air should be excluded from the hot steel as much as possible to prevent oxidation.

Forging

In forging—either hand forging or drop forging—the piece is heated to the desired temperature, usually from 1800° F. to 2100° F., depending on the metal, and then formed into the desired shape.

In hand forging the shaping is accomplished by hammering, swaging and rolling until the desired shape is formed. In drop forging the heated piece is placed under a drop hammer and pressed to the desired shape by means of dies, one die being fixed to the hammer and the other die fixed to the bed plate.

In forging, the piece should be heated slowly and thoroughly until the desired temperature is obtained and this temperature maintained until the forging is complete.

Quenching

In order to have good results when a tool is hardened, it is necessary that the tool is quickly and uniformly cooled. Too much stress cannot be laid upon the above. If the bath is too small, the hot steel will quickly warm the quenching liquid, causing it to act as a tempering bath rather than a hardening bath.

Barium Chloride

Barium Chloride hardening is extensively used on account of the ease of regulating the temperature. When a tool is drawn from the bath a film is formed over it and thus protects the cutting edges.

Barium Chloride hardening is used for taps, milling cutters, cutting dies, etc.

Lead Hardening

Lead hardening is used for reamers, twist drills, cutlery, etc. The lead is heated to a temperature of 1700° F. to 1900° F., and the pieces to be hardened are placed in the heated lead after they have been pre-heated to about 800° F.

When the pieces have attained the temperature of the bath they are withdrawn and quenched in oil.

The lead should be chemically pure and a layer of charcoal should be placed over the top to prevent oxidation.

Tempering

When a tool is tempered, its degree of hardness is modified by reheating to 400-630° F. and by slow or rapid cooling the brittleness and hardness is

reduced and the tool is increased in toughness and ductility.

The slower the tool is heated the tougher it will be. The degree of heat depends upon the work the tool is to be used for and the quality of the steel.

The tools are heated in oven furnaces, oil baths, lead baths, sand and salt. They are cooled in water, oil or air.

High Speed Steel

High Speed Steel is now generally used for cutting tools in place of carbon steel. It includes compounds of iron with Tungsten, Vanadium, Chromium, Manganese, Molybdenum and other elements all of which possess toughness and intense hardness. With tools of high speed steel, cutting can be done at a higher rate of speed from which the steel is given its name.

High Speed Steel can be used at such a cutting speed that the point becomes red hot but it does not lose its toughness or temper. It maintains its hardness while very hot, does not need tempering, is extremely hard and has a high melting point.

Boiler Horse Power

One Boiler Horse Power is equal to an evaporation of 30 pounds of water per hour from a feed water temperature of 100° F. into steam at 70 lbs. gage pressure. This is equivalent to 34.5 units of evaporation, i. e.,

1 B.H.P. = 34.5 lbs. of water evaporated from and at 212° F. Factor of evaporation at 70 lbs. gage pressure equals 1.1494.

$30 \times 1.1494 = 34.482$ or 34.5 lbs. water.

Notes on Firing Boilers With Fuel Oil

In ordinary heating plants: One pound of coal will evaporate 7 to 8 pounds of water.

In high pressure plants where higher efficiencies are obtained: One pound of coal will evaporate 8 to 10 pounds of water.

In the average heating plant: One pound of oil will evaporate 12 to 14 pounds of water.

In high pressure plants: One pound of oil will evaporate 14 to 15 pounds of water.

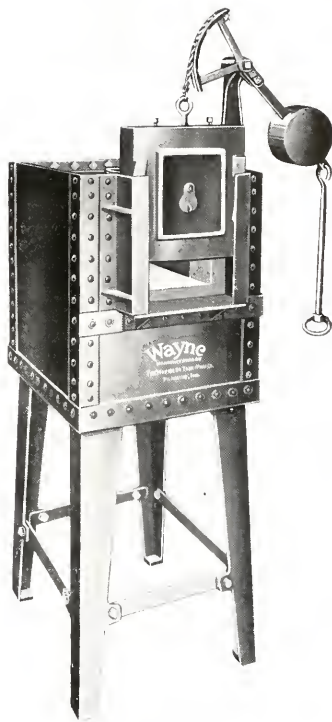
Therefore: A plant capable of evaporating 10 pounds of water with one pound of good coal would evaporate 15 pounds of water with one pound of oil; or, two pounds of oil will do the same work as three pounds of coal.

Another figure: 4 barrels of oil (42 gallons per barrel) equals 2000 pounds of high grade coal.

For a rough estimate, it may be considered that one gallon of oil will evaporate 112 to 120 pounds of water, therefore, approximately one-half gallon of oil per minute (30 gallons per hour) will produce 100 H.P.

A boiler should have one cubic foot of fire box volume below the tubes, per Boiler Horse Power to be developed.

When boilers are rated according to their heating surface, about 15 sq. ft. is generally taken as the unit for one horsepower for return tubular type and 10 to 12 sq. ft. for water tube type.



Oven Type Furnace

One square foot of grate surface will consume 10 to 12 pounds of hard coal or 18 to 20 pounds of soft coal per hour, with natural draft. With forced draft this amount can be doubled.

Brass Mixtures

Yellow Brass—Used in plumbing fixtures: 66% Copper, 32% to 33% Zinc, 1% to 1½% Lead.

Steam Metal—Used in steam goods, radiators, etc.: 85% Copper, 5% Tin, 5% Lead, 5% Zinc.

Phosphor Bronze Ingot—Used in locomotive and machinery bearings: 80% Copper, 10% Tin, 10% Lead with phosphorus added.

Commercial Phosphor Bronze—Used in bearings whose requirements are not as critical as the above: 79% to 80% Copper, 9% to 10% Tin, 9% to 10% Lead, 1% to 1½% Zinc.

Manganese Bronze—Used in propeller blades, automobile parts, etc., where a high tensile strength is required: 56% to 62% Copper, 37% to 42% Zinc with small percentage of iron and a very small percentage of aluminum allowed.

Valve Metal—Used in valve bodies, etc.: 87% Copper, 7% Tin, 2% Lead, 4% Zinc.

Gun Metal—88% Copper, 8% Tin, 2% Zinc, 4% Lead.

Type of Furnace For Various Kind of Work

Annealing	Oven Furnaces
Assaying and Cupelling	Muffle Furnaces
Brazing	Brazing Forges
Babbitt Metal Melting	Metal Melting Furnace, Crucible—Non-Crucible
Brass Melting	Brass Melting Furnace, Crucible—Non-Crucible
Case Hardening	Oven Furnace, Cyanide Crucible Furnace
Carbonizing	Oven Furnace
Crucible Melting	Iron, Steel or Graphite, Crucible Furnace
Cyanide Hardening	Steel Crucible With Hood
Cutlery Hardening	Oven Furnace, Lead Bath Crucible Furnace
Cutter Hardening	Oven Furnace
Drop Forging	Forge Furnace
Die Hardening	Oven Furnace
Enameling	Muffle Furnace
Forging	Forge Furnace
Hardening	Oven, Forge, Crucible Furnace
High Speed Steel Hardening	Oven, Forge, Barium Chloride Furnaces
Knife Blade Hardening	Oven Furnace, Lead Hardening Furnace
Lathe Tool Hardening	Forge, Oven, Lead Pot Furnace
Melting Aluminum, Brass and Various Soft Metals	Crucible and Non-Crucible Furnace
Milling Cutter Hardening	Oven Furnace
Oil Tempering	Oil Tempering Pot Furnace
Pre-Heating	Oven Furnace
Rivet Heating	Forge, Rivet, Heating Furnace
Rod Heating	Forge Furnace
Rolls	Oven Furnace
Reamer Heating	Oven Furnace, Lead Hardening Furnace
Re-Heating	Oven Furnace
Shafts	Oven Furnace
Spring Hardening	Oven Furnace, Lead Hardening Furnace
Shear Blade Hardening	Oven Furnace, Lead Hardening Furnace
Tempering	Oil Tempering Furnace
Tinning	Soft Metal Furnace
Type Metal Melting	Soft Metal Furnace
Tool Hardening	Forge, Oven, Lead Bath Furnaces
Welding	Forge Furnace

Equivalent Temperatures Reading—Fahrenheit to Centigrade Scale

Calorific Value of Fuels

B.T.U. Value

	Fahr.	C.			
350	176.67	Fahr.	C.	Oil	
375	190.56	1300	704.44	1 Lb. Fuel Oil (Ave.)	19,200
400	204.44	1350	732.22	1 Gal. Fuel Oil (7.5 Lbs.)	144,000
425	218.33	1400	760.00	1 Bbl. Fuel Oil (315 Lbs., 42 Gal.)	6,048,000
450	232.22	1450	787.78	1 Lb. Kerosene	16,120
475	246.11	1500	815.56	1 Lb. Gasoline	14,200
500	260.00	1550	843.33	1 Lb. Denatured Alcohol	13,140
550	287.78	1600	871.11	1 Lb. Alcohol, 90%	10,080
600	315.66	1650	898.89	1 Lb. Coal Tar	16,260
650	243.33	1700	926.67	Coal	
700	371.11	1750	954.44	1 Lb. Pocahontas Coal	15,400
750	398.89	1800	982.22	1 Lb. Bituminous (Eastern)	13,200
800	426.67	1850	1010.00	1 Lb. Bituminous (Western)	10,500
850	454.44	1900	1037.78	1 Lb. Anthracite	12,000-14,000
900	482.22	1950	1065.56	1 Lb. Coke	13,400
950	510.00	2000	1093.33	Gas	
1000	537.78	2050	1121.11	1 Cu. Ft. Illuminating Gas (City Coal Gas)	550-650
1050	565.56	2100	1148.89	1 Cu. Ft. Natural Gas	800-1000
1100	593.33	2150	1176.67	1 Cu. Ft. Producers Gas (Bituminous)	146
1150	621.11	2200	1204.44	1 Cu. Ft. Producers Gas (Anthracite)	139
1200	648.89	2250	1232.22	Electricity	
1250	676.67	2300	1260.00	1 Kilowatt Hour of Electricity	3,412
Fahr.	C.	2350	1287.78		
60	15.56	2400	1315.56	Comparative Heat Value of Different Fuels	
70	21.11	2450	1343.33		Gals. Oil
80	26.67	2500	1371.11	1 Ton Average Coal or Coke	180
90	32.22	2550	1398.89	1000 Cu. Ft. City Coal Gas	42
100	37.78	2600	1426.67	1000 Cu. Ft. Natural Gas	7
125	51.67	2650	1454.44	1000 Cu. Ft. Producer Gas	1
150	65.56	2700	1482.22	42 K. W. H. of Electricity	1
175	79.44	2750	1510.00	In Actual Practice	
200	93.33	2800	1537.78		Gals. Oil
225	107.22	2850	1565.56	1 Ton Average Coal or Coke	50 to 150
250	121.11	2900	1593.33	1000 Cu. Ft. City Coal Gas	42
275	135.00	2950	1621.11	1000 Cu. Ft. Natural Gas	7
300	148.89	3000	1648.89	1000 Cu. Ft. Producer Gas	1
325	162.78			23.5 K. W. H. of Electricity	1

Temperatures and Their Relative Colors

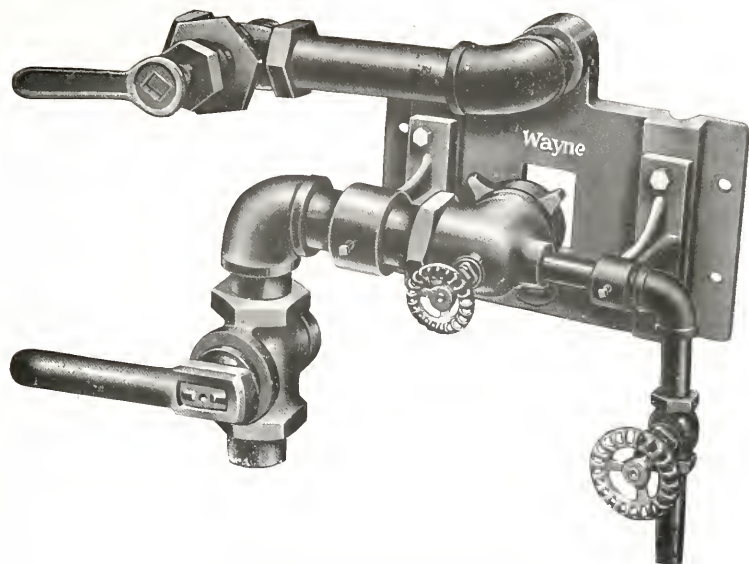
Degree Fahr.	Color
430	Very Pale Yellow
460	Straw Yellow
480	Dark Yellow
500	Brown Yellow
520	Brown Purple
540	Full Purple
560	Full Blue
600	Very Dark Blue
752	Red Heat—Visible in the Dark
885	Red Heat—Visible in the Twilight
975	Red Heat—Visible in the Daylight
1292	Dark Red
1652	Cherry Red
1832	Bright Cherry Red
2012	Orange Red
2192	Orange Yellow
2372	Yellow White
2552	White Welding Heat
2732	Brilliant White
2912	Dazzling White (Bluish White)

Temperature Required

Annealing Steel	900-1300° Fahr.
Annealing Malleable Iron	1000-1400° Fahr.
Annealing Malleable Cupola Iron	1500-1700° Fahr.
Annealing Glass	950-1200° Fahr.
Working Glass	1200-1475° Fahr.
Hardening Tool Steel	1200-1400° Fahr.
Case Hardening Iron and Soft Steel	1300-1500° Fahr.
Annealing High Speed Steel	1400-1460° Fahr.
Hardening High Speed Steel	1750-2550° Fahr.

Dimensions of Standard Welded Pipe

Size Inches	Diameter Inches		Area	
	External	Internal	External Sq. In.	Internal Sq. In.
1 ₈	0.405	0.269	0.129	0.057
1 ₄	.540	.364	.229	.104
3 ₈	.675	.493	.358	.191
1 ₂	.840	.622	.554	.304
3 ₄	1.050	.824	.866	.533
1	1.315	1.049	1.358	.864
1 ₄	1.660	1.380	2.164	1.496
1 ₂	1.900	1.610	2.835	2.036
2	2.375	2.067	4.430	3.356
2 ₁	2.875	2.469	6.492	4.788
3	3.500	3.068	9.621	7.393
3 ₁	4.000	3.548	12.566	9.887
4	4.500	4.026	15.904	12.730
4 ₁	5.000	4.506	19.635	15.947
5	5.563	5.047	24.306	20.006
6	6.625	6.065	34.472	28.890
7	7.625	7.023	45.664	38.738
8	8.626	7.981	58.426	50.027
9	9.625	8.941	72.760	62.786
10	10.750	10.020	90.763	78.854
11	11.750	11.000	108.434	95.033
12	12.750	12.000	127.676	113.097
		14.000	153.938	137.886
		15.000	176.715	159.485
		16.000	201.062	182.654
		18.000	254.469	233.705
		20.000	314.159	291.039
		22.000	380.133	354.656
		24.000	452.389	424.557



Combination Gas and Oil Burner

Loss of Pressure Due to Friction in Pipe 100 Feet Long—Pounds Per Square Inch

Gallons Discharged Per Min.	$\frac{3}{4}$ -Inch	1-Inch	$1\frac{1}{4}$ -Inch	$1\frac{1}{2}$ -Inch	2-Inch	$2\frac{1}{2}$ -Inch	3-Inch	4-Inch
5	3.3	0.84	0.31	0.12				
10	13.0	3.16	1.05	0.47	0.12			
15	28.7	6.98	2.38	0.97				
20	50.4	12.3	4.07	1.66	0.42			
25	78.0	19.0	6.40	2.62		0.21	0.10	
30		27.5	9.15	3.75	0.91			
35		37.0	12.4	5.05				
40		48.0	16.1	6.52	1.60			
45			20.2	8.15				
50			24.9	10.0	2.44	0.81	0.35	0.09
75			56.1	22.4	5.32	1.80	0.74	
100				39.0	9.46	3.20	1.31	0.33
125					14.9	4.89	1.99	
150					21.2	7.0	2.85	0.69
175					28.1	9.46	3.85	
200					37.5	12.47	5.02	1.22

Specific Gravity, Weight, Melting Point of Various Substances

Name	Specific Gravity	Wt. Per Cu. In. Lbs.	Wt. Per Cu. Ft. Lbs.	Melting Point Degrees Fahr.
Aluminum	2.56	0.0924	159.7	1200
Antimony	6.71	0.2422	418.7	1150
Barium	3.75	0.1354	234.0	1560
Brass	8.36	0.3018	521.7	1700-1850
Bronze	8.85	0.3195	552.2	1675
Chromium	6.50	0.2347	405.6	2740
Copper	8.82	0.3184	550.4	1940
Gold	19.32	0.6975	1205.4	1930
Iron, Cast	7.20	0.2600	449.2	2100-2300
Iron, Wrought	7.85	0.2834	489.8	2900
Lead	11.37	0.4105	709.5	620
Manganese	7.42	0.2679	463.0	2200
Molybdenum	8.56	0.3090	534.2	4500
Nickel	8.80	0.3177	549.1	2600
Platinum	22.67	0.8184	1414.6	3200
Potassium	0.87	0.0314	54.3	144
Silver	10.53	0.3802	657.1	1740
Sodium	0.98	0.0354	61.1	200
Steel	7.80	0.2816	486.7	2500-2700
Tin	7.29	0.2632	454.8	446
Tungsten	18.77	0.6776	1171.2	5400
Zinc	6.86	0.2476	428.1	785

Imperial Gallon = 277.46 Cu. In.

Imperial Gallon = .16 Cu. Ft.

Imperial Gallon = 10.00 Pounds

Imperial Gallon = 1.2 U. S. Gallons

U. S. Gallon = 231.0 Cu. In.

U. S. Gallon = 0.134 Cu. Ft.

U. S. Gallon = 8.33 Pounds

U. S. Gallon = .83 Imp. Gallon

One Lb. Water = 27.74 Cu. In.

One Lb. Water = .083 U. S. Gallon

One Lb. Water = .10 Imp. Gallon

One Cwt. Water = 11.2 Imp. Gallons

One Cwt. Water = 13.44 U. S. Gallons

One Ton Water = 35.96 Cu. Ft.

One Ton Water = 224.00 Imp. Gallons

One Ton Water = 268.8 U. S. Gallons

One Cubic Inch Water = .036 Pound

One Cubic Inch Water = .0036 Imp. Gallon

One Cubic Inch Water = .0043 U. S. Gallon

One Cubic Foot Water = .027 Tons

One Cubic Foot Water = .55 Cwt.

One Cubic Foot Water = 62.27 Pounds

One Cubic Foot Water = 6.22 Imp. Gallons

One Cubic Foot Water = 7.48 U. S. Gallons

Relation Between Specific Gravity, B . Weight Per Gallon, Weight Cubic Foot of Fuel Oil

Sp. Gr.	B	Wt. Gal. Lbs.	Wt. Bbl.	Wt. Cu. Ft.	Cu. Ft. Ton	Gal. Ton	Bbl. Ton
1.0000	10	8.33	349.86	62.355	35.9	268.9	6.43
.9929	11	8.27	347.34	61.912	36.1	270.8	6.46
.9859	12	8.21	344.82	61.475	36.5	272.8	6.50
.9790	13	8.16	342.72	61.045	36.7	274.6	6.54
.9722	14	8.10	340.20	60.621	36.9	276.6	6.59
.9655	15	8.04	337.68	60.202	37.2	278.6	6.65
.9589	16	7.99	335.58	59.792	37.5	280.3	6.69
.9523	17	7.93	333.06	59.380	37.7	282.4	6.73
.9459	18	7.88	330.96	58.981	38.1	284.2	6.77
.9395	19	7.83	328.86	58.582	38.3	286	6.82
.9333	20	7.78	326.76	58.195	38.5	287.9	6.86
.9271	21	7.72	324.24	57.809	38.8	290	6.91
.9210	22	7.67	322.14	57.428	39	292	6.96
.9150	23	7.62	320.04	57.053	39.2	293.9	7.01
.9090	24	7.57	317.94	56.680	39.5	295.7	7.06
.9032	25	7.53	316.26	56.319	39.8	297.4	7.09
.8974	26	7.48	314.16	55.957	40.1	299.4	7.14
.8917	27	7.43	312.06	55.601	40.3	301.4	7.18
.8860	28	7.38	309.96	55.149	40.6	303.5	7.24
.8805	29	7.34	308.28	54.903	40.8	305.2	7.28
.8750	30	7.29	306.18	54.560	41.1	307.2	7.32
.8484	35	7.07	296.94	52.991	42.4	316.8	7.55
.8235	40	6.86	288.12	51.349	43.7	326.3	7.78

Capacities of Round Tanks—One Foot High

Dia. in Feet	Gallons	Dia. in Feet	Gallons	Dia. in Feet	Gallons	Dia. in Feet	Gallons
2	23.5	9	476	16	1,504	28	4,606
3	52.9	10	588	17	1,698	30	5,288
4	94	11	711	18	1,903	32	6,016
5	147	12	846	19	2,121	36	7,617
6	212	13	993	20	2,350	40	9,400
7	288	14	1,152	22	2,844	45	11,897
8	376	15	1,322	24	3,384	56	14,688
				26	3,971	60	21,151

Wayne Oil Burning Service

It is not our desire to sell simply burners, furnaces or tanks, etc. It is our desire to render Oil Burning Service and make a satisfied user of every purchaser. It is impossible for us to do this unless you regard all of the necessary equipment as one complete system—as a unit—and select, assemble and install the equipment accordingly.

At our home office and at each of our branch offices throughout the country, we maintain a force of engineers who will gladly aid you in selecting equipment and planning an oil burning system to meet your special requirements. There is no charge or obligation on your part for this service.

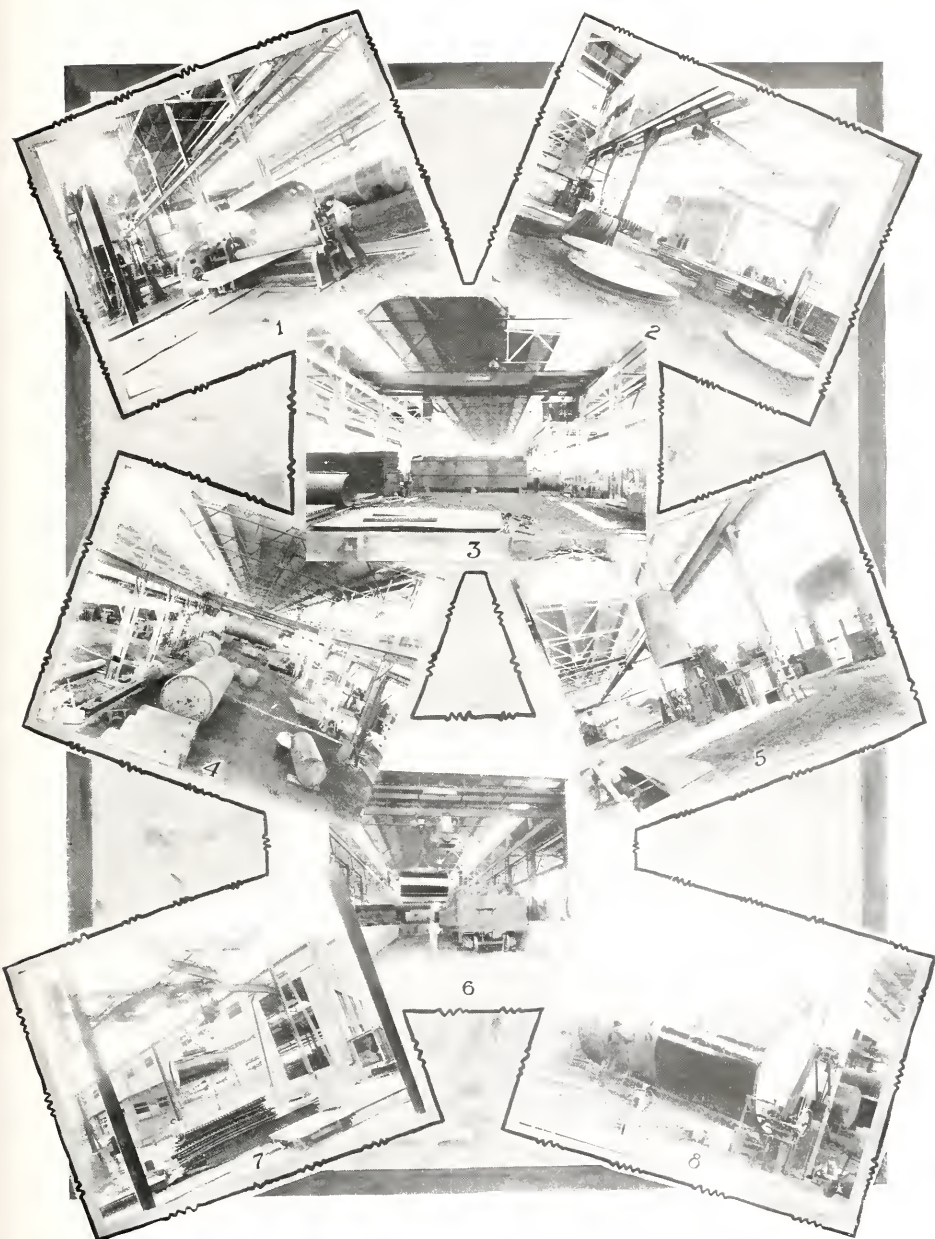
Wayne Oil Burning Equipment

Wayne Oil Burning Equipment includes Furnaces for Metal Melting, Forging, Welding, and Heat Treating; Oil Burners, Combination Gas and Oil Burners and Oil Burning Systems of several different types for operating Industrial Furnace and Power Boilers. These Oil Burning Systems consist of Storage Tanks of all practical capacities, Quenching Tanks, Oil Pumps, Oil Heaters, Automatic Pressure Regulators for Oil and Air, Automatic Cut-Off Valves, Blowers, Air Compressors, Thermometers, and all necessary Special Fittings and Accessories.

We also maintain a force of erecting engineers who are competent to supervise and aid in the installation of this equipment. In fact, we furnish everything necessary for complete installations with the exception of standard pipe and fittings, which can be purchased locally in the desired lengths and sizes.

Wayne Guarantee

All Wayne Equipment is covered by our two years guarantee against any defects in workmanship or material which may become apparent within that time. We also guarantee that when such equipment is purchased in accordance with our recommendations and is installed, operated and cared for in accordance with our directions it will perform the work for which it is intended in a reliable and efficient manner.



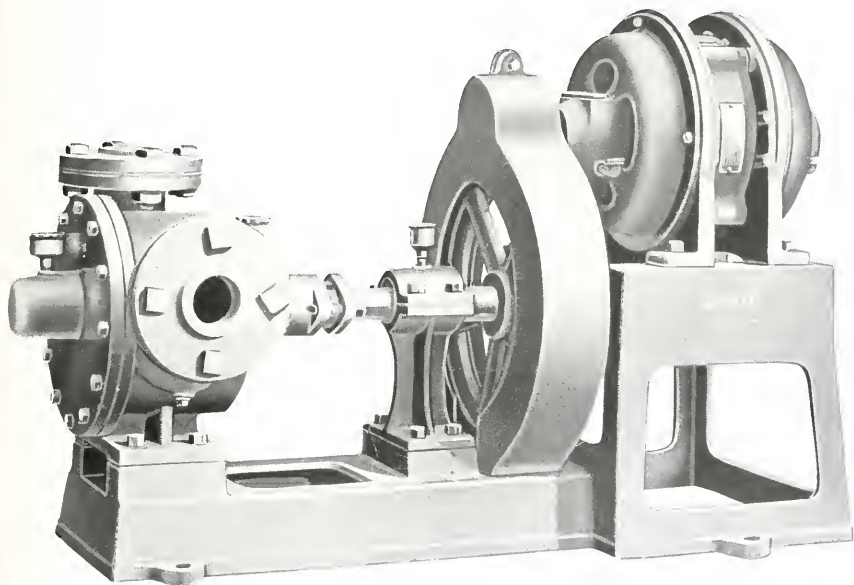
Interior Views of Heavy Metal Tank Shop—Wayne Oil Tank and Pump Company





Impeller Type Power Pumps

BULLETIN No. 4010



Cut No. 4010 Impeller Pump

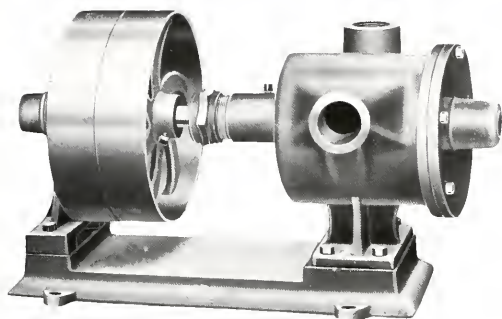
The Wayne Impeller Power Pumps are especially designed to pump Fuel Oil, Lubricating Oils, Paint Oils, Varnish, Gasoline, Naphtha and similar liquids. They are constructed to draw the liquid from underground tanks, above ground or basement tanks, or from tank cars, delivering same at locations remote from the original source. These pumps, however, should only be used under conditions where a pressure at the pump of not over 30 pounds per square inch is required.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating



Cut No. 4020 Impeller Pump

General Description

The Cut No. 4010, 4015 and 4020 pumps are all of the same general design and made in the sizes listed on the back of the bulletin, the different cut numbers simply indicating the different forms of drive, such as motor, belt or chain drive.

The Wayne Impeller Power Pump embodies many new ideas in the construction of such pumps, all of which have definitely proven their advantages in lengthening the life of the pump and increasing its efficiency.

The pronounced advantages in favor of this pump, a cross section of which is shown on the opposite page, are the facts that about two-thirds of the impeller blades (3) are inside the rotor when at their farthest swing outwards, affording greatest leverage; the wear of the blades is automatically taken up by the springs (5); the springs are not continually compressed and expanded as the pump revolves, avoiding crystallization; the blades are statically balanced by means of the ports (6); the inlet and outlet ports are so designed that the wear on the edges of the blades is even; and the pump is exceptionally large for the capacity. The pump is always in prime, has high suction properties, and operates smoothly.

Construction

The principal parts of this pump consist of a cast iron cylinder body, cylinder head, revolving piston or rotor mounted on a steel shaft with four bronze impeller blades.

A stuffing box is cast integral with the cylinder head. This stuffing box together with the outboard bearing gives a greater support to the shaft than is customarily found in this type of pump.

The stuffing box and outboard bearing have been designed to insure long life and thus reduce to a minimum all opportunity of vibratory movement of the shaft due to wear in the bearings.

A grease cup is set in the packing gland and in the outboard bearing head, providing ample lubrication of the shaft. This method of lubrication allows the pump to operate successfully when pumping non-lubricating fluids, such as gasoline.

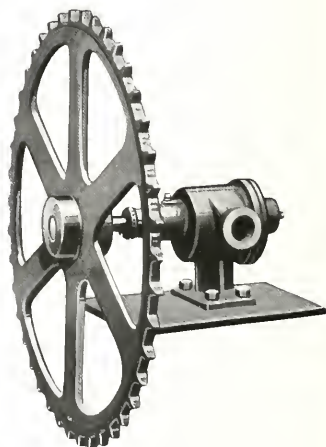
Operation

The pump casing (1) has an inlet port (14) and an outlet port (15). This casing is bored circular.

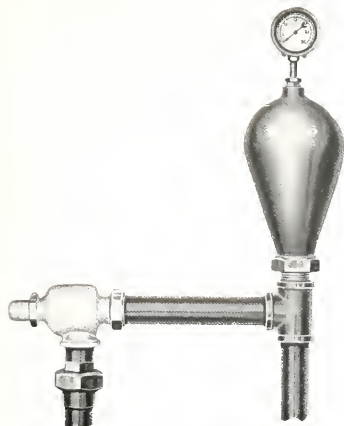
The rotor (2) fits into the casing in the manner shown, the axis or shaft being eccentric to the casing. The rotor (2) is slotted to receive four bronze blades (3). The blades are fitted with ports (6) which face in the direction of rotation and permit the liquid being pumped to pass through these ports. This causes the blade to become statically balanced, thereby automatically sealing the blades against the casing.

Tube (4) performs the function of spacer between the opposite blades and also contains a spring (5) which holds the blades against the casing. It will be seen that these springs do not expand and contract as the pump revolves, but simply hold the blades in place so that crystallization of springs is avoided and the pump immediately picks up the suction without the necessity of high rotative speed to hold them against the casing by centrifugal force.

(16) and (16) represent diagonal ribs across the inlet and outlet ports which prevent the blades from being worn at the sides and becoming "hump backed".



Cut No. 4015 Impeller Pump



Type A By-Pass

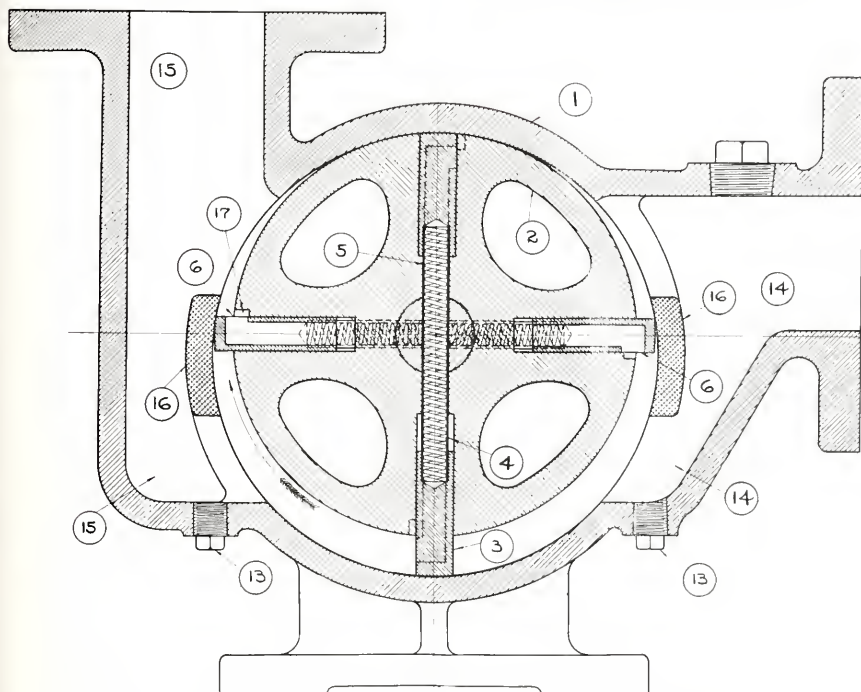
This type of By-Pass is furnished standard with Air Chamber, Spring Type Relief Valve and Pressure Gauge. It may be used with any of the sizes or types of pumps listed herein. The liquid is by-passed back to the suction line from a tee fitted into the discharge pipe at the pump.



Type B By-Pass

This type of By-Pass is furnished standard with Air Chamber, Weighted Type Relief Valve and Pressure Gauge. It is designed especially for use in connection with pumps discharging direct to oil burners.

This by-pass will only be furnished with the No. 00, 0, 1 and 1 $\frac{1}{4}$ sizes of pumps.



CROSS SECTION OF WAYNE IMPELLER TYPE POWER PUMP

STANDARD SIZES AND SPECIFICATIONS ON WAYNE IMPELLER TYPE POWER PUMPS

Pump No.	Pipe Connections Inches†	Capacity Gals. per Minute	Speed R. P. M.	Size of Pulleys Inches	Size of Motor H. P.‡	FLOOR SPACE		Shipping Weight	
						Belt Drive	Motor Drive	Belt Drive Lbs.	Motor Drive Lbs.
*00	1	5	100						
*0	1½	10	100						
1	1	10	350	6 x 1¾	1½ — 3½	8" x 15"	14" x 25"	70	185
1½	1½	20	250	8 x 2¼	1 — 1½	9" x 20"	14" x 28"	100	225
1½½	1½½	50	250	10 x 2¼	2 — 3	10" x 24"	19" x 36"	125	300
2	2	75	200	12 x 2¼	3 — 5	18" x 30"	20" x 39"	230	375
3	3	100	200	1½ x 4½	5 — 7½	18" x 38"	24" x 48"	480	800
4	4	200	200	24 x 6	7½ — 10	24" x 48"	24" x 56"	625	950

‡These two sizes are only furnished in the Cut No. 4015 Type.

§Lower horsepower motors for pressures not exceeding 15 pounds per square inch. Higher horsepower motors for pressures not exceeding 30 pounds' pressure per square inch.

†Pumps Nos. 00 to 1½ fitted with screw connections. Nos. 2 to 4 fitted with pipe flange connections.

Electric Motors: All electric motors furnished are of the highest grade, standard types, and are of most approved makes.

Should customer furnish motor, dimension sheet of motor should be sent with order. All motors should be 1150 R.P.M. Direct current or single phase alternating current motors should be totally enclosed.

Foot Valves: Whenever the pump is to be used in connection with flow meters, foot valves should be used. Foot valves are also advantageous on exceptionally high suction lifts in order to avoid priming of the pump.

Standard Equipment: The Cut No. 4010 pump is furnished complete with substantial cast iron bed plate, gear and rawhide pinion, gear guard, electric motor if desired, and either Type A or Type B by-pass.

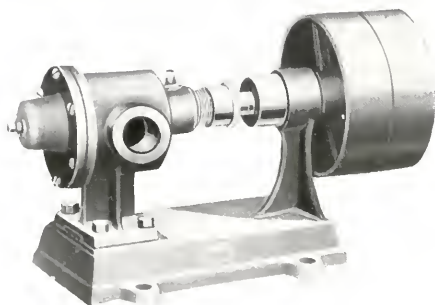
The Cut No. 4020 pump is furnished standard with cast iron bed plate, tight and loose pulleys and either Type A or Type B by-pass.

The Cut No. 4015 pump is furnished standard with sprocket wheel, suitable length of chain, bracket, and Type B by pass.

NOTE: Orders for pumps not including either the Type A or B by-pass will not be accepted.

DATA REQUIRED

In order to make a quotation on your requirements it is necessary that you answer as many of the following questions as is possible:



Cut No. 4020 Size No. 1 Impeller Pump

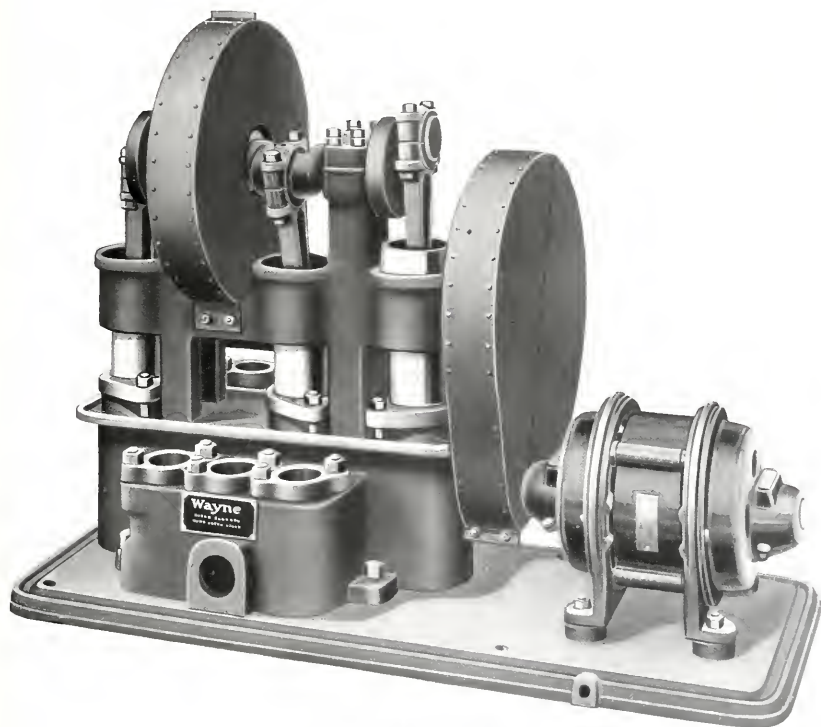
1. For what liquid is the pump to be used?
2. Give maximum amount of liquid in gallons per minute that the pump will be required to deliver.
3. Size of suction pipe if now installed?
4. Size of discharge pipe if now installed?
5. Total distance of pump above bottom level of tank? (Should not be over twelve feet.)
6. Total length of suction pipe in a horizontal run?
7. Total length of discharge pipe in a horizontal run?
8. Total vertical height above pump to which liquid is to be discharged?
9. If electric motor is to be furnished state the electrical current to be used. If alternating current state voltage, phase and cycle. If direct current state voltage.
10. If the pump is to handle fuel oil state whether it will be required to pump direct to burners or simply to storage or gravity tanks.
11. Give cold test of oils if known.

NOTE: See Bulletin No. 2 for data on selecting the proper power pump for the duty to be performed and for rules on calculating the proper sizes of suction and discharge pipes.



Triplex Plunger Type Power Pumps

BULLETIN No. 4025



Cat No. 1025 Plunger Pump

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

General Description: The Cut No. 4025 and No. 4030 pumps are both of the same general design and made in the sizes listed on the back of the bulletin, the different cut numbers simply indicating the different forms of drive, such as motor or belt drive.

The Wayne Triplex Plunger Type Power Pumps are especially designed to pump Fuel Oil, Lubricating Oils, Paint Oils, Varnish, Gasoline, Naptha and similar liquids.

This pump is of the single action type, the fluid in each of the three cylinders being displaced once per revolution of the crank shaft. The plungers are constantly submerged, thus keeping the pump primed at all times, enabling it to work on long suction lifts and to start at a moment's notice. This is probably the most popular type of pump for severe service where high pressures are necessary.

These pumps are designed for use under conditions where a pressure at the pump is required of over 30 pounds per square inch and not over 150 pounds. They are constructed to draw the liquid from underground tanks, above ground or basement tanks, or from tank cars, delivering same at locations remote from the original source.

Construction: This pump is very compact, occupying but a small amount of floor space, yet every part is very readily accessible.

Necessary adjustments for crank shaft, pinion

shaft and crank pin bearings are provided, these adjustments being of a simple nature and very readily made. There are no complicated adjustments to get out of order or give trouble to the operator.

The pump is of the straight flow type, making it particularly suitable for handling oil and similar liquids, that is, the suction valves are on one side and the discharge valves on the other side, the fluid flowing through the pump without reversing the direction of the flow.

A flange is cast on the top of the cylinders, forming a basin to catch all leakages from the stuffing boxes, thus preventing the oil from running down over the pump onto the floor.

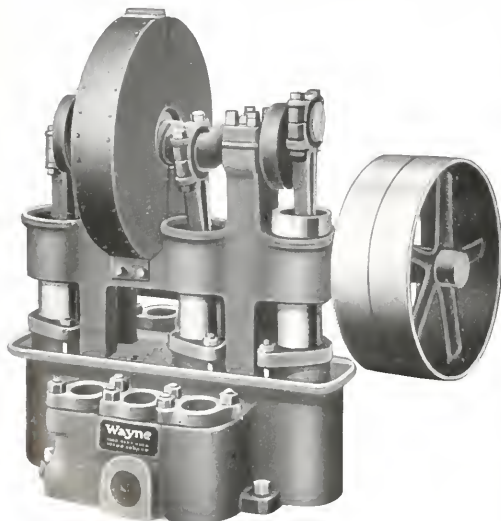
Pinion Shaft: The pinion shaft is steel, finished all over and polished; being perfectly smooth and true to size, it can be run at proper speed without vibration or heating of the journals. The pinion and the tight pulley, or gear, are keyed to the shaft.

Gearing: The large gears are of special gear iron of high tensile strength and the teeth are machine cut. The small gears are machine cut from the solid blank with special cutters for the required number of teeth, thus insuring quiet and smooth operation.

The location of the gear is particularly well chosen, it being located between the bearings on the crankshaft, thus maintaining the gears in perfect alignment at all times. The involute gear tooth has been adopted for the reason that it is the most practical form and permits of a large amount of adjustment, thus preserving the utility of the tooth even when the bearings have become worn.

Crankshaft: The uniform velocity of the liquid discharged is a question of great importance with crank-driven pumps, as an unequal flow of fluid means not only that the working strains will be unequally distributed throughout the pump, but also that the load on the gearing or driving parts will be irregular. The crank pins are set at an angle of 120 degrees with each other and by this arrangement the strokes follow and overlap each other, thus insuring an easy flow through the delivery pipe.

The standard crankshaft is of the composite design, with the center crank pin a part of the shaft; the ends of this shaft are fitted with discs and pins, which are accurately forced into position by hydraulic pressure. The cheek pieces of the U-part



Cut No. 4030 Plunger Pump

are especially heavy, and in every way well adapted for their work. The composite type is preferable to the single-piece crankshaft, as any part can be replaced without requiring an entire new shaft.

Frame: The frame of this machine deserves especial notice. The box section pillar or column design is used for all standard pumps, thus giving the greatest strength and rigidity and the best distribution of metal known to engineers.

Bearings: The bearings, both of the main shaft and of the pinion shaft, are of ample length and proportion to prevent undue heating or wear. All bearings are filled with No. 1 genuine babbit and are properly grooved to insure perfect lubrication and an easy running machine.

Connecting Rods: The outside connecting rods are of the solid end type, provided at both ends with adjustable boxes which permit of micrometer adjustment by means of a wedge and screw. The center rod is necessarily of the fork-end type. The boxes are babbitted with No. 1 genuine babbit which produces not only one of the most durable but the safest anti-friction box in use at the present time. The crank end of each rod is fitted to its crank pin, and the lower end is connected to the cross head pin.

Guides: The guides and the cylinder stuffing boxes are made in one casting and are bored at a single setting, thus assuring positive alignment of guides and plungers.

Lubrication: The lubrication of this machine has been carefully considered; grease cups, of liberal size and the best that the market affords, are furnished on all bearings that are subject to wear.

Bolts, Studs and Nuts: These are the product of our own shop and therefore the best. Our department for this class of work is fully equipped with modern machinery, and much care is exercised in the selection of the materials.

Plungers: The plungers are bolted to the cross-heads and can be easily removed. They are made of a special hard iron, and the construction permits of substituting any other metal particularly adapted for the fluid to be pumped.

Type A By-Pass: The Type A By-Pass should always be used with these pumps in order to avoid breakage of the pump or pipe due to excessive pressure caused by closing a valve in the discharge pipe while the pump is running. This outfit consists of an Air Chamber, Relief Valve and Pressure Gauge.

Fluid Cylinders: The fluid cylinders for the larger sizes are made separate from the base of the

pump, which is very desirable. The cylinders are provided with deep stud gland stuffing boxes packed from the outside, and as the fluid cylinders are separate from any other part of the machine, repairs can be easily and cheaply made in case of breakage from any cause. This feature also permits substituting some other metal for cast-iron, which change is every often desirable, as the fluid to be pumped may contain chemicals that necessitate the use of bronze of special composition.

Standard pumps for handling oil have plunger throats brass lined and are fitted with special gaskets.

Liquid Chest: The liquid chest is a peculiar feature of this pump, and is, where applicable, so constructed that it can be separated from the cylinders in case of needed repairs.

Valves: Each valve is separately accessible by removal of the plug directly over the valve. This arrangement of valves requires only small circular gaskets and eliminates special gaskets which are frequently troublesome in connection with pumping oil. Furthermore, the arrangement of the valves makes each valve readily accessible for inspection or regrinding if necessary. Valves are of composition, of the disc type and working on brass seats which are put in on a taper fit, thus insuring their being held tightly in place and preventing their unscrewing or working loose.



Type A By-Pass

Standard Sizes and Specifications on Wayne Plunger Type Pumps, Cut Nos. 4025 and 4030*

Size No.	Size		Displacement		Diameter Pipes		Pulleys Tight and Loose		Ratio of Gearing	Shipping Weight, Pounds		Approximate Floor Space, Inches		
	Diameter of Plugging	Length of Stroke	Gallons per Revolution	Revolutions per Minute	Gallons per Minute	Suction	Discharge	Diameter		Face	Cut 4025	Cut 4030	Cut 4025	Cut 4030
1	2	3	.122	50	6.1	11½	11½	12	21½	5—1	350	225	24 x 37	15 x 22
2	2½	4	.255	50	12.7	21½	15	31½	5—1	675	525	24 x 49	20 x 30	
3	3	4	.36	50	18.3	21½	15	31½	5—1	700	550	24 x 49	20 x 30	
4	4	4	.652	50	32.6	21½	2	18	31½	5—1	1600	1200	30 x 53	24 x 39
5	4	6	.979	50	49.0	3	21½	20	41½	5—1	1700	1300	27 x 64	26 x 41

*In some cases details may vary slightly from cut, but general construction will be the same.

Motor Horsepower Required for Driving Cut No. 4025 Pump.

Size No.	POUNDS PRESSURE PER SQUARE INCH					
	0 to 25		25 to 50		50 to 100	
1	1	H. P.	1	H. P.	1 $\frac{1}{2}$	H. P.
2	1 $\frac{1}{2}$	H. P.	1 $\frac{1}{2}$	H. P.	2	H. P.
3	1 $\frac{1}{2}$	H. P.	2	H. P.	3	H. P.
4	2	H. P.	3	H. P.	5	H. P.
5	2	H. P.	3	H. P.	5	H. P.

Electric Motors: All electric motors furnished are of the highest grade, standard type, and are of most approved makes. Should customer furnish motor, dimension sheet of motor should be sent with order. All motors should be 1150 R. P. M., Direct Current or Single Phase Alternating Current Motors should be totally enclosed when used on pumps handling gasoline or other volatile oils.

Foot Valves: Whenever the pump is to be used in connection with flow meters, foot valves should be used. Foot valves are also advantageous on exceptionally high lifts in order to avoid priming of the pump.

Standard Equipment: The Cut No. 4025 Pump is furnished standard with substantial cast iron bed plate, gears, rawhide pinion, gear guards, Type A By-Pass, and electric motor if desired.

The Cut No. 4030 Pump is furnished standard with tight and loose pulleys, gear guard and Type A By-Pass.

DATA REQUIRED.

In order to make a quotation on your requirements it is necessary that you answer as many of the following questions as is possible:

- 1—For what liquid is the pump to be used?
- 2—Give maximum amount of liquid in gallons per minute that the pump will be required to deliver.
- 3—Size of suction pipe if now installed?
- 4—Size of discharge pipe if now installed?
- 5—Total distance of pump above bottom level of tank? (Should not be over twelve feet.)
- 6—Total length of suction pipe in a horizontal run?
- 7—Total length of discharge pipe in a horizontal run?
- 8—Total vertical height above pump to which liquid is to be discharged?
- 9—If electric motor is to be furnished state the electrical current to be used. If alternating current state voltage, phase and cycle. If direct current state voltage.
- 10—If the pump is to handle fuel oil state whether it will be required to pump direct to burners or simply to storage or gravity tanks.
- 11—Give cold test of oil if known.

NOTE: See Bulletin No. 2 for data on selecting the proper power pump for the duty to be performed and for rules on calculating the proper sizes of suction and discharge pipes.

Wayne

Oil Burning Systems

BULLETIN No. 2520

An Engineering Problem

Although oil is probably the most extensively used fuel in industrial plants for melting, forging, heat-treating, etc., it is nevertheless often burned in a very indifferent manner with varying degrees of inefficiency. Little regard is also given to economy and safety. In most cases such conditions are due to the use of home made appliances, and the improper selection, assembly, and installation of the various items entering into the oil burning system, although each item might be of excellent design and construction in itself.

If the most efficient and satisfactory results are to be obtained each item used in the oil burning system must be specially designed for the purpose and the complete system must be considered as a unit and selected, assembled, and installed accordingly. In fact every item must fit, or co-ordinate with, every other item.

It is quite an engineering problem to properly assemble and install a complete oil burning system as many scientific principles are involved and must be applied. In fact, this work should only be placed in the hands of those who are practically and technically qualified to undertake it.

Insurance Requirements

It is, of course, advisable to select and install oil burning systems in such a manner that the very lowest fire insurance rate will be secured and the greatest measure of safety will be afforded. It is as easy to burn oil with perfect safety as it is to burn it in a hazardous method but due to lack of knowledge of the subject and carelessness, improperly designed and installed systems have caused many serious fires.

Wayne Systems

We furnish everything necessary for complete oil burning systems with the exception of standard pipe and pipe fittings which the customer can secure locally in the desired lengths and sizes. These systems include Metal Melting, Forging, and Heat-Treating Furnaces, Oil Burners, Air Compressors, Oil Pumps, Storage Tanks, Special Fittings and Accessories.

Wayne Service

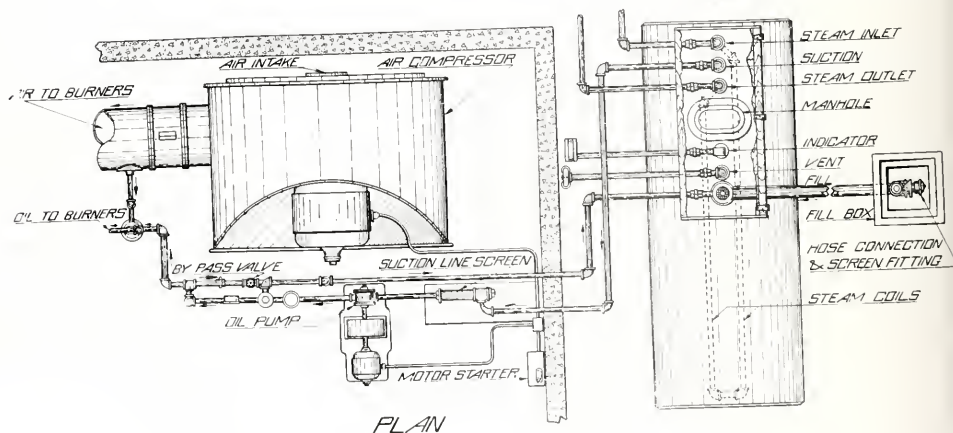
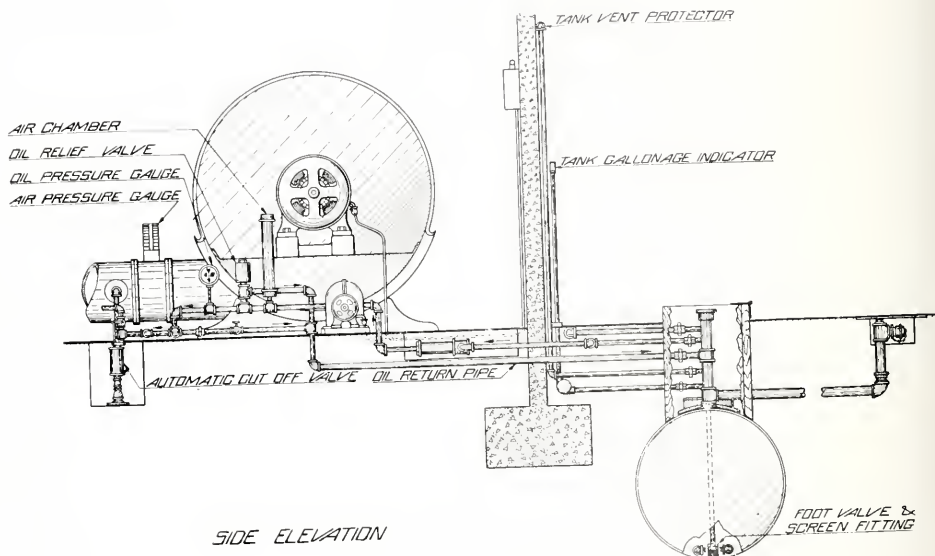
At our home office, and at each of our branch offices throughout the country, we maintain a force of engineers who are competent to aid you in selecting and installing proper oil burning equipment to meet your special requirements. There is no charge or obligation on your part for this service.

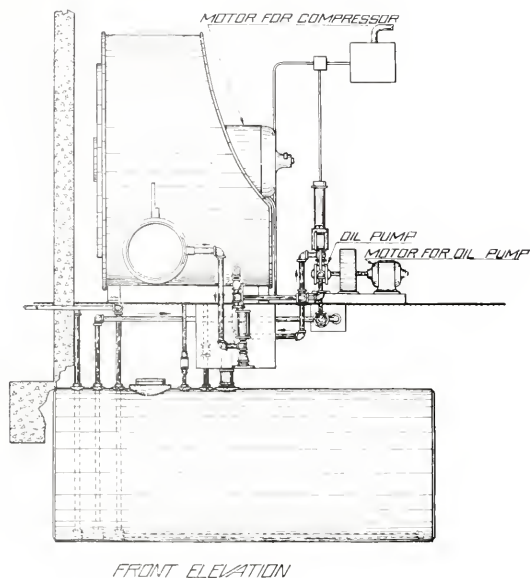
Wayne Oil Tank & Pump Company

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Fort Wayne, Indiana, U. S. A.

Oil Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating



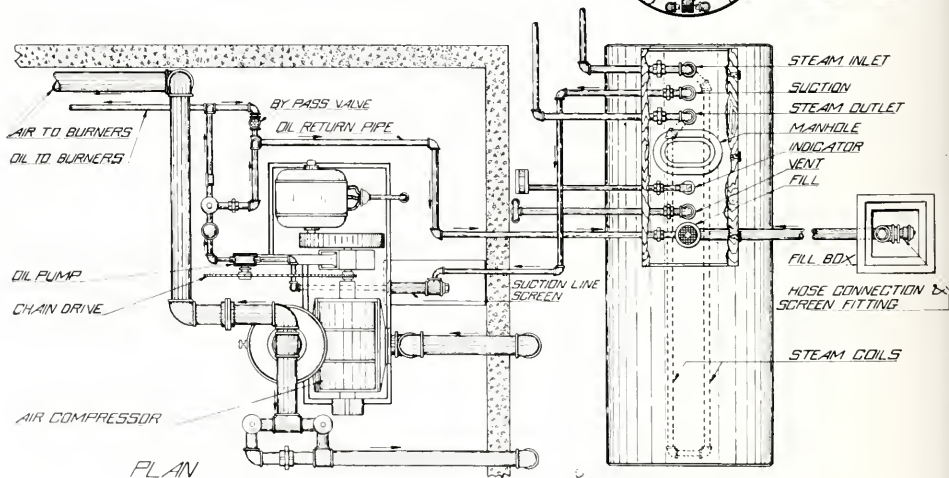
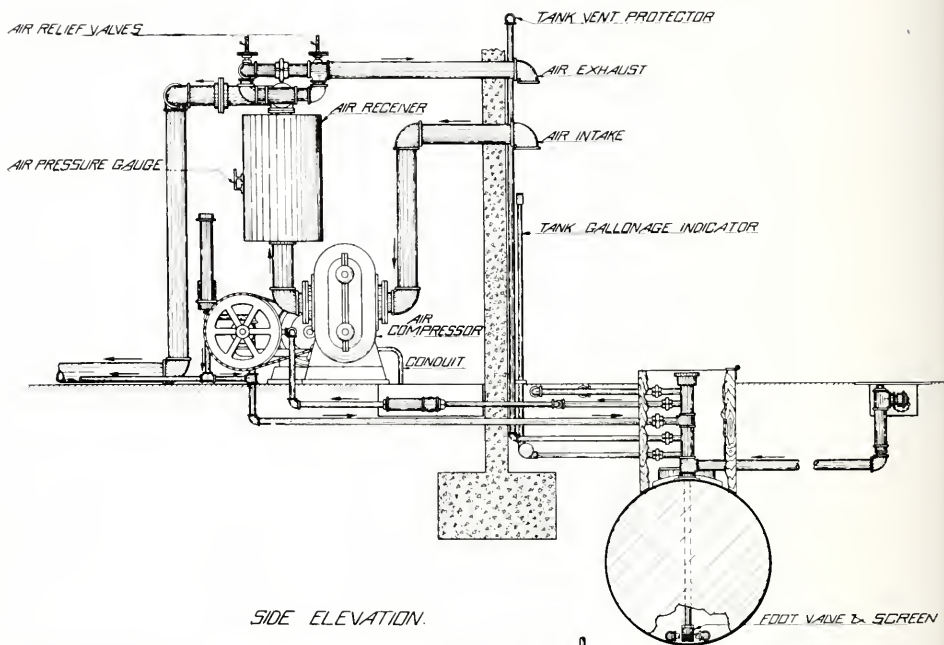


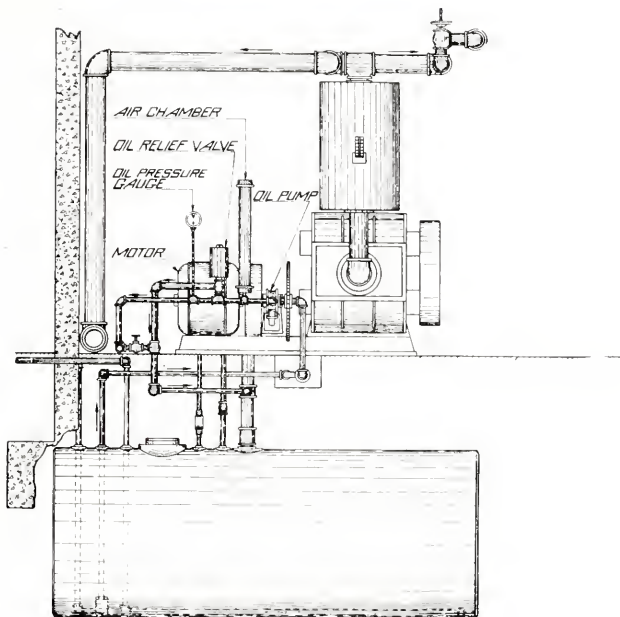
Cut No. 2550 Oil Burning System

The Cut No. 2550 Oil Burning System is of the Non-Positive Pressure Type. That is, the amount of power consumed by the motor in driving the compressor is in practically direct proportion to the amount of air delivered or used at the burners. Therefore, this type of system is the most economical in operation when the amount of oil burned varies during the day or from day to day. Systems using fan, centrifugal, or turbo types of air compressors all conform to this lay-out.

This system includes the Storage Tank or Tanks, Air Compressor, Oil Pump and such special fittings as Manhole, Steam Coils, Car Fill Connection, Fill Box, Vent Protector and Tank Gallonage Indicator for the Tank; Air Pressure Gauge for the Air Compressor; Foot Valves, Air Chamber, Oil Relief Valve, and Oil Pressure Gauge for the Oil Pump. Strainers for the fill and suction lines, Foot Valve Strainer, By-Pass Valve, and Fire Arresters are also furnished standard.

An automatic Cut-Off Valve should always be furnished with this type of oil burning system.





FRONT ELEVATION.

Cut No. 2554 Oil Burning System

The Cut No. 2554 Oil Burning System is of the Positive Pressure Type. That is, the air is delivered under a positive pressure and whatever air is not used at the burners must escape through the air relief valves. In this way the consumption of power by the motor is the same at all times regardless of the number of burners in operation.

This system includes the Storage Tank or Tanks, Air Compressor, Oil Pump and such special fittings as Manhole, Steam Coils, Car Fill Connection, Fill Box, Vent Protector and Tank Gallonage Indicator for the Tank; Air Receiver, Air Relief Valves, and Pressure Gauge for the Air Compressor; Foot Valves, Air Chamber, Oil Relief Valve, Oil Pressure Gauge, Sprockets and Chain for the Oil Pump. Strainers for the fill and suction lines, Foot Valve Strainer, By-Pass Valve, and Fire Arresters are also furnished standard.

General Description

Complete oil burning equipment, of course, includes the furnaces and oil burners. However, the means of supplying oil and air to the burners is the part of the equipment usually referred to as the Oil Burning System. Naturally these systems vary in size and capacity, depending upon the number of burners which they supply or the amount of oil to be burned.

Uniform Pressure: The Cut No. 2550 and No. 2554 Oil Burning Systems are designed to deliver air to the burners under a pressure in most cases of $1\frac{1}{2}$ pounds per square inch, and oil to the burners under a pressure of 5 pounds per square inch. A UNIFORM AND STEADY PRESSURE of oil and air FREE FROM PULSATIONS is delivered to the burners regardless of the number of burners in operation. In fact, should twenty burners be in operation and ten of these burners shut down the pressures of oil and air will not be increased at the remaining ten burners. On the other hand, should there be ten burners in operation and ten more burners suddenly started up, the pressures of oil and air will not fail.

Co-ordination: It will be noted that in the Cut No. 2550 System the air compressor and the oil pump are each driven from a separate power source or motor, although belt drive may be used in either case. Therefore, with this system, an Automatic Cut-Off Valve is always installed. This valve is so connected into the system that should the air compressor stop the flow of oil will also stop.

In the Cut No. 2554 System it will be noted that the oil pump is driven by means of sprockets and chain from the shaft of the air compressor which is possible with this slow speed type of compressor. In this way, should the air compressor stop the oil pump will also stop.

By the above methods of co-ordinating the air and oil supply lines, it is impossible to discharge atomized oil into a hot furnace. Lack of care in this direction has caused many serious fires.

Operation: The operation of the complete oil burning system is as follows: The Furnace is the chamber in which the oil is burned and in which the metal is heated or melted. The Oil Burner is the means of atomizing the oil and projecting it into the furnace together with an accurate proportion of air to complete the combustion. The Air Compressor supplies the necessary air for combustion and for atomizing the oil. The Oil Pump draws the oil from the storage tank and delivers it automatically to the burners.

Any excess of oil which the pump discharges is carried back to the storage tank by means of a separate pipe which is fitted at the pump with a special Non Vibrating, Weighted Type Relief Valve.

The Storage Tank, or Tanks, are buried underground outside of the building. This tank is fitted

with internal Steam Coils and whenever it is necessary to burn especially heavy oils, all oil pipe lines are paralleled with steam lines. The Tank Gallonage Indicators, with which tanks are fitted, show at a glance the contents of the tanks.

The Air Chamber with which the pump is fitted is especially designed to remove all pulsations from the flow of oil. The Air Receiver with which the positive pressure type of air compressor is fitted is also especially designed to remove all pulsations from the flow of air. This air receiver is not necessary with the non-positive type of machine.

Installation: Both of these systems are installed so that the oil pipe gradually slopes from the oil burners back to the pump and from the pump back to the storage tank. A By-Pass Valve is installed at the pump which allows the oil to be easily and quickly drained from the system back to the tank at night or in case of fire or a broken pipe line.

A fill pipe of ample size is run from the tank to a point near the railroad siding where it is fitted with a strainer and hose connection for filling from tank cars. A vent pipe is run from the tank to a suitable vent protector. A suction line is run from the foot valves in the tank to the pump and the discharge line from the pump to the burners. A separate pipe is run from the relief valve back to the tank. This pipe is always one pipe size larger than the discharge pipe.

The sizes of oil and air pipes depend entirely upon the amount of oil and air to be moved. The sizes and lay out of these pipes should be scientifically figured in order to obtain the greatest efficiency and reduce as much as possible the loss of pressure due to friction in the pipes. These pipe sizes and lay out will vary in practically every installation.

Above Ground Storage: When it is impossible to bury the storage tank or tanks and where these tanks are above the pump or burner level, a special reservoir tank of about 5 or 10 barrels' capacity is installed below ground and below the large storage tanks. This reservoir tank is fed by gravity from the large tanks but the oil first passes through a float box. The level of oil in this reservoir tank is maintained by the float box which prevents it from overflowing. The pump then draws the oil from the reservoir tank in the regular manner. This prevents the danger of flooding the building with oil should a burner be left open or a pipe line be broken.

Systems Not Approved

Most systems employing direct feed to the burners by gravity, stand pipes, and pressure systems by means of which oil is forced to the burners by placing an air pressure on the storage tank, are dangerous and their use is usually disapproved by the insurance people.

Data Required

In order to submit a proposal and specify the proper oil burning equipment for your requirements, it is essential that you furnish us with answers to as many of the following questions as is possible:

(A) If you wish to install a new system throughout, please answer the following questions:

1. What kind or kinds of work do you wish to do?—melting, forging, rivet heating, annealing, case hardening, tempering, etc.
2. Describe as clearly as possible the metal, or piece, to be melted, forged, or heat-treated. If possible submit drawings of each piece.
3. State the speed of production desired in each operation.
4. State the number of hours per day that your system will be in continuous operation.
5. Submit a drawing if possible of your plant showing preferred location of storage tank, compressor, oil pump, and furnaces.
6. What is the probable yearly percentage of increase in your production in this department.

(B) If you have furnaces already installed and which you wish to change to oil burning or improve your present oil burning system, please answer the following questions:

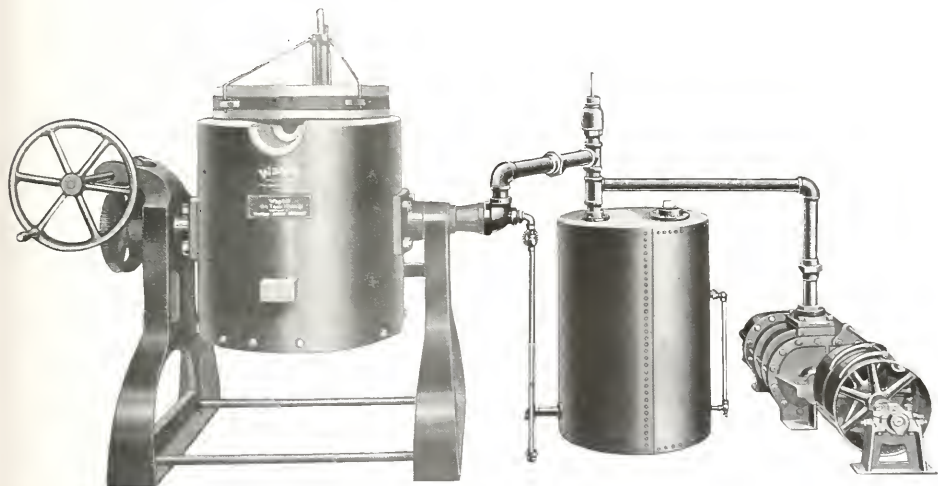
1. State kind of fuel you are now using. If oil state its specific gravity; if gas state whether natural gas, artificial city gas, or producer gas. Give B. T. U. value if possible. If hard or soft coal or coke state which.
2. State maximum quantity of fuel consumed per hour. If possible give the consumption per hour for each fire—gallons of oil—cubic feet of gas—or pounds of coal or coke.
3. Give the dimensions of the working space of each furnace or fire and describe as clearly as possible the construction of the furnace—give name or make if possible.
4. Describe as clearly as possible the operation being performed at each fire. Give speed of production desired in each case.
5. Have you any compressed air available—1½ pounds per square inch is best? If so, state volume and pressure—number of cubic feet per minute and ounces or pounds pressure per square inch.
6. Have you a source of oil supply available? If so state whether it is gravity, air pressure, or pump feed. Describe whichever system is used.

(C) If you wish to install additional furnaces only, please answer questions Nos. 1, 2, and 3 under (A) and Nos. 1, 5, and 6 under (B).



Portable Oil Burning System

BULLETIN No. 2556



Cut No. 2556 Oil Burning System.

The Wayne Cut No. 2556 Portable Oil Burning System is designed for the temporary operation of one or two furnaces or for testing purposes. With this system the danger of feeding oil to the burners by gravity and the expense of a permanent installation are avoided. The system may be used in connection with any of the various types of Wayne oil burning furnaces. The cut of a tilting crucible type of furnace is simply used to show the application of the equipment.

Fuel Oil, Kerosene, or any but the very heavy oils may be efficiently burned with this system.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

Cut No. 2556---General Description

This system possesses the fundamental essentials in a proper oil burning system in that both the air and oil are delivered to the burners under a constant and automatically regulated pressure, free from pulsations, and so coordinated that oil can not be discharged to the burner unless air for atomization is being discharged at the same time.

Standard Equipment: The standard equipment consists of a one or two barrel capacity type V tank fitted with gauge glass, fill flange with plug, air pipe flange, and discharge pipe flange; rotary type air compressor, or blower; weighted type air relief valve; and air pressure gauge.

The oil and air pipes are not furnished as they can be secured locally in the desired lengths and sizes.

A tank of two barrels capacity is recommended as oil can then be purchased in barrel lots and a full barrel can be placed in the tank at once without the necessity of pumping the tank dry and still allow sufficient air space in the tank above the level of the oil.

Operation: The air pipe from the blower is connected into a tee fitted into the air pipe flange on the tank and from this tee is run to the air connection of the burner. The air relief valve and air pressure gauge may be placed at any convenient point in this air line. The oil pipe is run directly from the connection on the tank to the burner. The air relief valve is set to maintain a two pound pressure.

The action of the system is such that the pressure of air on the surface of the oil in the tank forces the oil through the oil discharge pipe to the burner. In this way the blower serves to discharge the oil as well as the air, through separate pipes, to the burner. The space in the tank occupied by the air also serves as an air receiver, eliminating all pulsations from the flow of both the air and oil.

It will be noted that as soon as the blower stops the flow of oil must also stop. In this way the danger of discharging unatomized oil into a hot furnace is avoided.

Installation: The blower must be placed for convenient drive from a line shaft or power source and the tank should be placed as near as possible to the blower. The furnaces should be placed within a reasonable distance.

The air pipe should be carried the full size of the connection on the blower to the burner. All traps and many elbows should be avoided. The oil pipe should be at least 1 inch in diameter from the tank to the burner and elbows avoided as much as possible. All oil pipe threads should be carefully cut and fitted with a mixture of litharge and glycerine applied to the male end of the thread.

The blower, tank and furnaces should all be placed on the same level. The tank should never be filled to a higher level than the burner level.

In **Ordering** it is necessary that you state either the maximum number of gallons of oil per hour you wish to burn or advise us of the number of furnaces you wish to fire and the size, or capacity, of each.

Note: For Permanent Oil Burning Systems See Bulletin No. 2520.



Oil Burning Systems For Use With Power Boilers

BULLETIN No. 2560

An Engineering Problem

The burning of fuel oil has not been free from the waste and inefficiency prevalent in this country in the use of almost all raw material. It is safe to say that the majority of oil burning installations are being operated far below the percentage of efficiency that is possible with this fuel.

If the most efficient and satisfactory results are to be obtained each item used in the oil burning system must be specially designed for the purpose and the complete system must be considered as a unit and selected, assembled, and installed accordingly. In fact every item must fit, or co-ordinate, with every other item.

It is quite an engineering problem to properly assemble and install a complete oil burning system as many scientific principles are involved and must be applied. In fact, this work should only be placed in the hands of those who are practically and technically qualified to undertake it.

Insurance Requirements

It is, of course, advisable to select and install oil burning systems in such a manner that the very lowest fire insurance rate will be secured and the greatest measure of safety will be afforded. It is as easy to burn oil with perfect safety as it is to burn it in a hazardous method, but due to lack of knowledge of the subject and carelessness, improperly designed and installed systems have caused some serious fires.

Wayne Systems

Wayne Oil Burning Systems for use with Power Boilers include everything necessary for a complete installation with the exception of standard pipe and pipe fittings, which the customer can secure locally in the desired lengths and sizes. These systems consist of Burners, Pumps, Heaters, Storage Tanks, Automatic Pressure Regulators, Relief Valves, Automatic Cut-Off Valves, Thermometers and all necessary Special Fittings and Accessories. We also maintain a force of erecting engineers who are competent to supervise and aid in the installation of such equipment.

Wayne Service

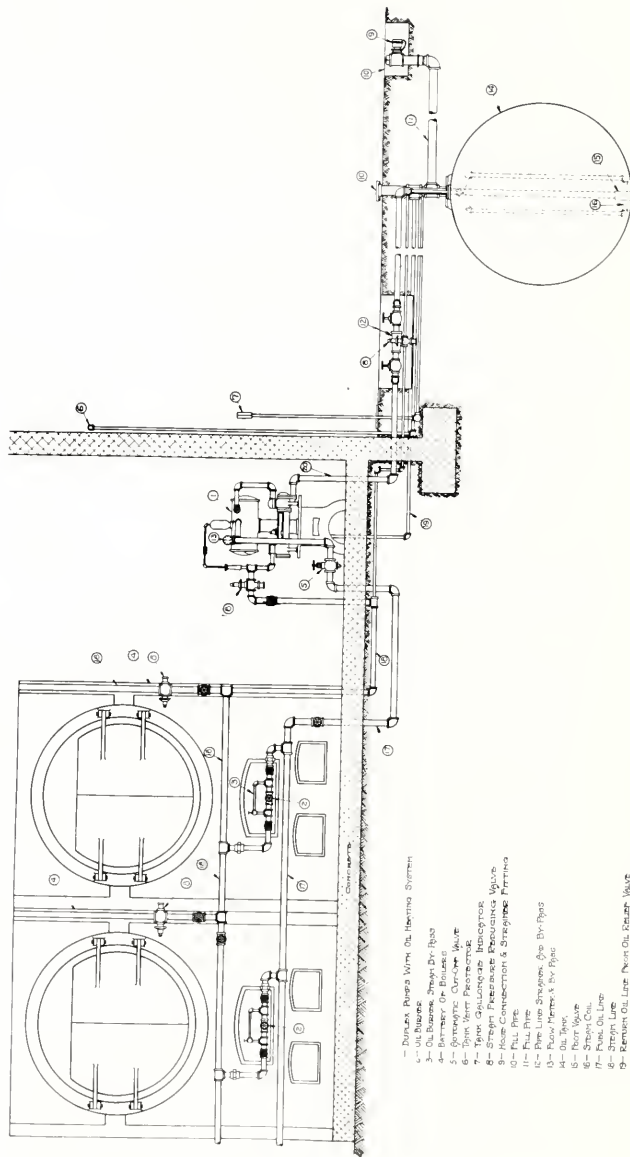
At our home office and at each of our branch offices throughout the country, we maintain a force of engineers who will gladly aid you in planning an oil burning system to meet your special requirements. There is no charge or obligation on your part for this service.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating



CUT NO. 2560 OIL BURNING SYSTEM FOR USE WITH POWER BOILERS

General Description

Complete oil burning systems, of course, include the combustion chamber and the oil burners. However, the supply system behind the burners is usually referred to as the Oil Burning System. Naturally such systems vary in capacity, or size, depending on the number of burners which they supply or the amount of oil to be burned during a given period.

The Cut No. 2560 Oil Burning System is ideal for operation in connection with Power Boilers. This system possesses the fundamental requirements of delivering oil to the burners in a **clean and properly heated condition, and under a constant and automatically regulated pressure, free from pulsations.**

This system may be applied to any of the different makes and types of boilers wherever a steam pressure of 25 pounds or more is carried. One system, of the proper capacity, will take care of any number of boilers in a power plant, although where a very large number of boilers are to be supplied it is advisable to install two or three complete pumping systems.

OPERATION—The operation of the Cut No. 2560 Oil Burning System is as follows: The steam supply pipe to the burners is connected with a tee placed in the main steam pipe at the top of the boiler and run down the face of the boiler to the burners. This pipe is heavily covered and traps avoided so as to decrease the condensation and deliver steam to the burners in as hot and dry a condition as is possible. If a steam pressure of over 100 pounds is carried a pressure reducing valve is placed in this line.

In a battery of boilers all fired by the one system the steam pipe is so connected and fitted with valves that the steam generated by any one of the boilers may be used for operating the burners on an adjacent cold boiler. When there is a possibility of the steam pressure in all of the boilers dropping to too low a pressure to start the burners, a compressed air line, when available, is connected into the steam header and this air pressure used for atomizing the oil until sufficient steam pressure has been generated. In other cases, a small coal or wood fired boiler is used for generating sufficient steam to start the larger boilers. If neither of these two expedients are available, it is necessary to place an extra small fire door in the boiler setting through which enough wood or rubbish can be fed to generate the required steam pressure to start the oil burners.

A branch steam pipe is run from the steam header to the pumps for their operation.

A suction pipe is run from the foot valves in the storage tank to the pump. When more than one tank is used, separate suction lines should be run from each tank to the base of the pump and connected at that point into a header with a valve installed in each line. **Suction line strainers** in duplicate are installed near the pump. These

strainers are fitted with three way valves at the inlet and outlet connections so that either strainer may be cleaned without the necessity of stopping the pump.

The pump discharges the oil into the oil heater and from that point it is delivered to the burners through a suitable pipe line. The discharge pipe from the pump is fitted with a **relief valve** so that any excess of oil pumped is carried back to the storage tank through a separate pipe.

An automatic pump governor is installed at the pump in the steam supply line and so connected that the speed of the pump, or volume of oil delivered, is automatically controlled. In this way a constant and automatically regulated pressure is maintained at all of the burners whether one or a dozen burners are in operation at one time. For instance, should there be twelve burners in operation and should six of these burners be shut off, the pressure in the supply line would be increased. However, this increased pressure causes the pump governor to decrease the amount of steam fed to the pump, thereby reducing the pump speed and so causing the pressure in the line to become equalized. On the other hand, when additional burners are started up the pump automatically speeds up, maintaining the pressure.

From the above it will be appreciated that the amount of exhaust steam available for heating the oil is in proportion to the volume of oil pumped.

An automatic cut-off valve is placed in the discharge pipe near the pump. Should a pipe burst in the boiler room or become broken in any way, this valve automatically closes, instantly stopping the flow of oil, thereby preventing the flooding of the boiler room with oil.

A by-pass valve is installed between the discharge and return pipe lines which when opened allows the oil to be easily and quickly drained from the system into the storage tank in case of a fire or the necessity of making repairs.

FIRE BOX—Although radical changes in the fire box construction are seldom necessary, certain changes must be made and the nature of these changes are of extreme importance if satisfactory results are to be secured. Our sales engineers will gladly advise as to the extent of such alterations and our erecting engineers are competent to undertake the work.

With certain types of boilers the bridge wall must be entirely removed or its position changed. In the majority of installations the grate bars are left in place and covered by a protecting layer of fire brick with spaces between them for the passage of the necessary air for combustion, this air being taken in through the ash pit door. With some types of boilers it is advisable to entirely remove the grate bars and build up a checkerwork of fire brick on the ash pit floor, allowing spaces between the brick for air to pass under and up through the space.

OIL BURNER—The oil burner is described in detail in another bulletin. This burner is mounted so as to fire either through the fire door, or through the ash door, as the case might be. The door is bricked up, leaving a hole $2\frac{1}{2}$ " high and $1\frac{1}{2}$ " wide for the burner tube to pass through. It is a more workmanlike job to remove the old door, place a sheet steel plate over the opening, and bolt the burner boss to this plate. This plate also serves to prevent air being drawn through the brick work, which is naturally more or less porous. One, two, or even three burners may be applied to one boiler, depending on its size.

The oil supply enters at one side of the burner and the steam enters at the opposite side. The oxygen of the steam used aids in combustion, but its principal use is as an atomizing agent; the necessary air for combustion being taken in by natural draft through the ash door.

PUMPS AND HEATERS—The oil pumping, heating and regulating system is described in detail in another bulletin. This system is a complete unit all mounted on one bed plate and consisting of two pumps (one for emergency use only); oil heater with thermometer; air chamber; relief valve; pressure gauge; automatic pump governor; and all necessary special fittings and valves.

The pumps are both of the duplex piston type driven by the steam from the boilers with which they operate. The exhaust steam is used for heating the oil by means of the coil in the heater. The system is so designed that the amount of exhaust steam available is just sufficient to properly heat the oil and therefore there is practically no waste of steam.

Direct connected motor driven plunger type pumps are sometimes used, but with such pumps it is necessary to supply live steam to the oil heater. The cost of this steam counteracts the greater efficiency of the electric pump. Another point in favor of the steam pump is the fact that, because of the automatic pump governor, the amount of steam used is in proportion to the amount of oil used, whereas with an electric pump the power consumption is at its maximum at all times regardless of the amount of oil being by-passed back to the tank.

Individual pumps and oil heaters may be installed but the cost of all of the necessary equipment is almost as great as the cost of the complete pumping, heating and regulating unit and is less efficient.

STORAGE TANKS—The storage tank, or tanks, are placed underground out of doors and on a level below the burners. Care, however, should be taken that the bottom of the tank is not more than 14 feet below the level of the pumps. These tanks should be placed near a railroad siding and a fill

pipe of ample size run from the tank to the track and fitted at that point with a strainer and hose connection for filling from tank cars by gravity. All fuel oil storage tanks should be fitted with steam coils.

When it is impossible to bury the storage tank, or tanks, and where the tanks must be placed above the burner level, a special reservoir tank of 5 or 10 barrels capacity is installed below ground or below the burner level. This reservoir tank is fed by gravity from the overhead tanks. The supply line is fitted with an automatic float valve placed just inside the small tank. In this way a constant level of oil is maintained in the reservoir tank and the danger of flooding a building with oil is avoided. The suction and return pipes are connected to this underground tank in the usual manner.

Each tank is fitted with a **gallonage indicator** which shows at a glance the contents of the tank.

INSTALLATION—All oil pipe should be installed to maintain a gradual slope from the burners to the pump and from the pump to the tanks. All oil pipe joints should be carefully cut and fitted with a mixture of litharge and glycerine applied to the male thread.

The sizes of both the steam and oil pipes should be scientifically figured to meet the local conditions if the most efficient results are to be obtained.

DATA REQUIRED

In order to submit a proposal and specify the proper oil burning equipment for your requirements, it is essential that you furnish us with answers to as many of the following questions as is possible:

1. How many boilers do you wish to fire?
2. Give name or make and type of each boiler. State rated horsepower of each.
3. What is maximum percentage of rated horsepower desired? State number of hours of such operation.
4. What is minimum percentage of rated horsepower desired? State number of hours of such operation.
5. What minimum and maximum steam pressure will each boiler carry?
6. What kind of fuel are you now using? Give B. T. U. value.
7. State maximum quantity of fuel now used per hour—pounds of coal—gallons of oil—cubic feet of gas.
8. Give the dimensions of each fire box and describe its construction. Send sketch if possible.
9. Describe layout of boiler room. If possible send plan and elevation sketches marking location of boilers, railroad siding, and desired location of tanks and pumps.
10. Have you a source of oil supply available? If so, state whether it is gravity, air pressure or pump feed. Describe whichever system is used.
11. Have you any compressed air available? If so state volume (cubic feet per minute) and pressure (pounds per square inch).
12. If possible state gravity of oil that will be burned.

NOTE—This system can not be used in connection with low pressure heating boilers. For such boilers the low pressure air type of burner and oil burning system must be used.



Tilting Crucible Type, Oil Burning Furnaces

BULLETIN No. 3015



CUT NO. 3015 FURNACE

Showing Cover Raised and Swung to One Side For Charging

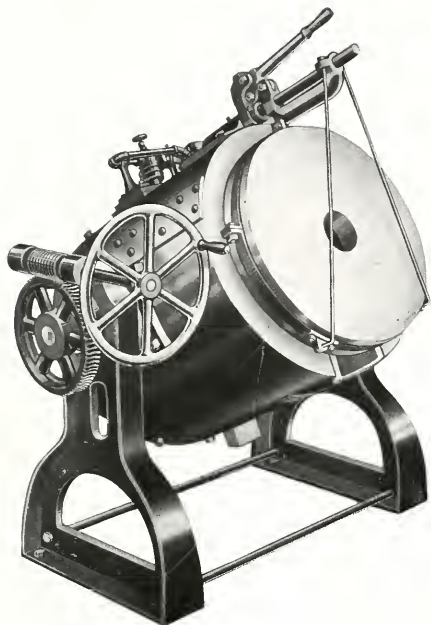
Wayne Tilting Crucible Type Oil Burning Furnaces are designed for the melting of Brass, Bronze, Copper, Aluminum, Nickel, Gold, Silver and other non-ferreous metals. They are ideal furnaces for the Reduction of Cyanide Precipitates.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating



Cut No. 3015 Furnace in Pouring Position

The installation of Wayne Tilting Crucible Type Melting Furnaces Increases Production, Reduces Costs, and Affords Ideal Working Conditions.

The scientific design and substantial construction of this furnace embodies many distinct advantages and improvements, a number of which are as follows:

1. The furnace is all above ground, is self-contained and ready for connection to oil and air supply lines.

2. Production is increased, due to rapid and perfect melting.

3. The metal is clean and castings are strong and sound.

4. Crucible bills are reduced, due to the fact that the crucible is never removed from the furnace during its life. Therefore it is not subject to the rapid expansion and contraction caused by sudden

changes in temperature as is the case when crucibles are removed from the furnace for pouring.

5. Crucibles are never handled by tongs.

6. The Crucible has U shaped lip, causing the metal to pour in a round, solid stream and preventing spilling of metal over sides of lip into the furnace.

7. The Crucible Stool is exceptionally high. The flame from the oil burner strikes this stool, and cannot strike the crucible direct.

8. Crucibles are of the best grade that can be obtained and are made by well known and reputable manufacturers in this line.

9. The crucible is always hottest at the bottom, thereby greatly aiding in rapid melting.

10. The fire is continued while pouring, as the burner tilts with the furnace, the flame protecting the metal and maintaining it at an even temperature.

11. The cover tilts with the furnace, protecting



Cut No. 3015 Furnace in Melting Position, Showing Oil Burner at Back

the metal from oxidation, protecting the operator from reflected heat and retaining the furnace heat.

12. The whole or a part of the metal may be poured or held without chilling, overheating, or oxidizing.

13. Spilled metal, caused by an old crucible breaking, is held in the furnace and can be poured out into the ladle through the slag hole.

14. The worm gear tilting arrangement automatically locks the furnace in any position. No brake necessary.

15. The cover locks in position when raised and can be swung to either side for charging furnace or renewing crucible.

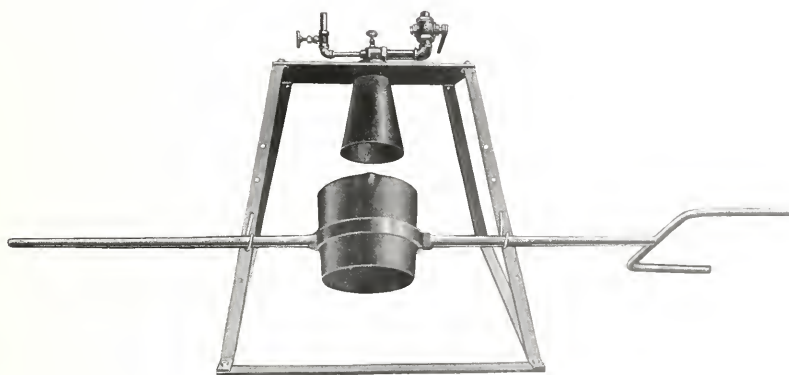
16. The walls of the furnace are exceptionally thick and are made of the best grade of fire clay tile in simple shapes. The outer lining need never be repaired.

17. The Oil Burner is designed for use with low pressure air and oil—the most efficient and economical type of oil burning system.



Cut No. 3015 Furnace, Showing Crucible and Double Lining

18. The shell of the furnace is made of heavy open hearth sheet steel. The legs, trunnions and lid lifting device are of cast iron. The worm wheel is constructed of special gear iron and the worm is of steel.



Cut No. 3085 Ladle Heater

Standard Sizes and Specifications

Cut No. 3015 Wayne Tilting Crucible Type Melting Furnaces

Size No. of Furnace.....	3	6	9
Maximum Crucible Capacity, Pounds Brass.....	200	350	750
*Average Heats on Brass, Per Day.....	6 to 10	5 to 9	3 to 5
Floor Space, Inches.....	36x66	39x68	42x70
Height to Cover.....	3' 8"	3' 10"	4'
Air Pipe Connections, Inches.....	2	2½	3
Oil Pipe Connection, Inches.....	½	½	½
Air Volume Required, Cubic Feet Per Minute.....	200	250	400
Shipping Weight Complete, Pounds.....	2000	2500	3000

*The time required for melting will vary with the kind of metal being melted and the speed with which the furnace is charged and poured. A furnace used continually every day or kept in constant use will melt quicker than a furnace only used intermittently.

The quantity of fuel oil required will depend on the kind of metal being melted, the speed with which the furnace is charged and poured, and the quality of oil used. 1½ to 2½ gallons of oil per 100 pounds of brass is a fair average.

Standard Equipment consists of furnace complete with crucible, low pressure air type of oil burner with adjustable tip, combination air and oil swing joint, air cock and globe valve for the oil line, and connecting unions.

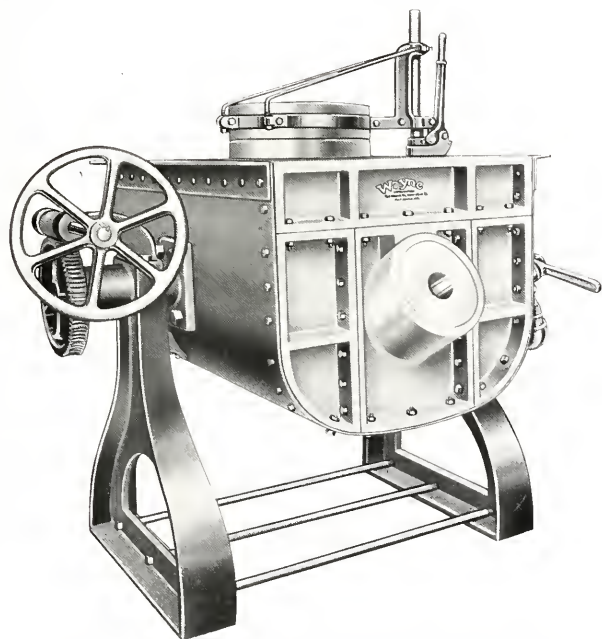
NOTE: We cannot guarantee the satisfactory operation of this furnace unless used in connection with a properly installed Oil Burning System which shall deliver the oil and air to the burners in sufficient volume and under a constant and automatically regulated pressure, free from pulsations. An air pressure of 1 to 2 pounds (1½ pounds best) and an oil pressure of 5 pounds or more must be used.

For Complete Oil Burning Systems See Bulletins No. 2520 and 2556.



Tilting Non-Crucible Type Oil Burning Furnaces

BULLETIN No. 3035



CUT NO. 3035 FURNACE—IN MELTING POSITION

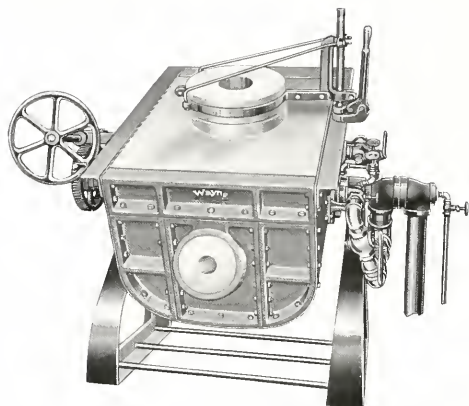
Wayne Tilting Non-Crucible, or Reverberatory, Type Oil Burning Furnaces are designed for the melting of Brass, Bronze, Copper, Aluminum, Nickel, Gold, Silver and other non-ferrous metals.

Wayne Oil Tank & Pump Company

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Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating



Cut No. 3035 Furnace—In Pouring Position

In order to meet every condition encountered in the melting of Brass, Bronze, Copper, etc., it is necessary to have the selection of the two principal types of melting furnace—the crucible type or the non-crucible, open hearth type.

No definite statement can be made as to the advantages of either type of furnace. As a general rule the crucible type is used when the metal or material to be melted contains a high percentage of volatile substances, such as a high percentage of zinc in brass, while the non-crucible type of furnace is used for melting red brass, etc. However, there is a lot of contradictory opinion on the matter, some preferring the use of crucibles for the melting of all kinds of non-ferrous metals and others preferring the non-crucible furnace for all such operations. Often the desire for rapid melting in large quantities and at low cost overbalances any consideration of the composition of the metal to be melted.

GENERAL DESCRIPTION

Wayne Non-Crucible Metal Melting Furnaces are especially advantageous for use when the non-crucible type of furnace is advisable. They possess many distinct improvements. They are simple and substantial in construction and so designed that the melting is very rapid, the percentage of loss of metal is exceptionally low, temperatures are easily and accurately controlled by simply turning the

proper valves, strong sound castings are secured, maximum comfort for the operator is afforded, and economical use of fuel is realized.

OPERATION:

The metal is melted directly on the hearth or bottom of the furnace. This hearth is almost flat, simply turning up at the sides. In this way the layer of metal is very thin and the greatest surface is exposed to the flame, thereby resulting in a much quicker melt at less expense than could be secured with a furnace having a bottom cylindrical or spherical in shape where the bottom of the melt would be a great distance from the upper surface exposed to the flame. This method of construction also avoids the necessity of rocking or rotating the furnace, which causes rapid wear of linings.

Two oil burners are used, mounted on one side of the furnace. This enables the operator to easily and quickly adjust both of the burners without leaving that side of the furnace. Combustion takes place close to the burner ports. A portion of the flame follows the arched roof of the furnace, thereby giving it a reverberatory motion. However, the lining is so constructed that the flame is also deflected to the front and back of the furnace so that it is spread just as evenly throughout the entire combustion chamber as could be secured with a number of burners mounted on both sides or both ends of the furnace.

The burners tilt with the furnace so that the flame is continued while pouring, thereby protecting the metal from oxidation and maintaining its temperature.

There is no direct blast of flame on the metal, thereby avoiding loss of metal from this source. The charge is simply melted down under a hot blanket of flame.

The oil and air are delivered to the burners under low pressure—1½ pounds pressure of air and 5 pounds or more pressure on the oil—the most economical type of oil burning system. The oil and air are fed to the burners through special swivel joints, the oil swivel joint being placed inside the swivel joint in the air line.



Crucible Pit Type, Oil Burning Furnaces

BULLETIN No. 3055



CUT NO. 3055 FURNACE

Back View Showing Oil Burner and Connection For Preheating Air

Wayne Crucible Pit Type Oil Burning Furnaces are designed for the melting of Brass, Bronze, Copper, Aluminum, Nickel, Gold, Silver, and other non-ferrous metals. They are ideal furnaces for the Reduction of Cyanide Precipitates.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

**Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating**

Cut No. 3055—General Description

The Wayne Crucible 1st Type Furnace possesses many distinct advantages. It is very substantially constructed of the best material available. The design is based on scientific principles so that perfect combustion of the fuel is secured and quick heats at the proper temperature are obtained with a minimum fuel consumption.

Pre-Heated Air: One great advantage with this furnace is the fact that the air discharged through the burner is first pre-heated by means of a pipe header imbedded in the bottom of the furnace. This feature alone demonstrates a fuel saving of 10% to 15%. The air pipe, as it enters the furnace, is split up into several header pipes of equal area thereby causing the minimum of resistance to the flow of air and greatly reducing its velocity through the hottest section of the heater.

Burner: This furnace is equipped standard with the Wayne Low Pressure Air Open Flame Type Burner, but may be fitted special with the Wayne Combination Gas and Oil burner for use with either Natural or Artificial Gas and Oil. With the open flame type of burner it is impossible to plug up the burner with molten metal when an old crucible breaks in the furnace.

Slag Door: Another important advantage is that this furnace is fitted at the front and near the bottom with a heavy cast iron hinged door lined with high temperature cement. This door prevents the flame from venting at this point, but allows the furnace to be easily and quickly cleaned. Melted brass from a cracked or broken crucible will push this door open and pour out on the floor thereby automatically draining the furnace.

Construction: The shell of this furnace is constructed of $\frac{1}{4}$ " plate steel in the No. 6 and No. 9 sizes and $\frac{3}{8}$ " steel in the No. 3 size. The bottom ring and furnace trimmings are of cast iron.

The lining and top are constructed of a very high grade of fire clay tile in simple shapes. The inside of the lining is coated with high temperature cement which will cause the lining to last indefinitely if patched up from time to time.

A thick layer of Insulating Cement is placed between the fire clay lining and the steel shell, thereby affording minimum loss of heat by radiation.

The Crucible rests on a high stool which protects it from direct blast of flame from the burner. This Crucible Stool is constructed of a Carborundum material having a tensile strength and wearing quality much higher than any fire clay mixture.

Cut No. 3055—Standard Sizes and Specifications.

Size No. of Furnace	3	6	9
Takes Standard Crucibles Sizes No.	40 to 70	80 to 125	150 to 275
*Average Heats on Brass, Per Day	6 to 10	5 to 9	3 to 5
Floor Space, Inches	36x30	39x33	42x36
Height to Cover, Inches	31	34	40
Size No. of Burner Used, for Brass (Cut 3625)	3	4	6
Size No. of Burner Used, for Aluminum (Cut 3625)	2	3	4
Size Air Pipe Connection, Inches	2	2½	3
Size Oil Pipe Connection, Inches	½	½	½
Size of Hole in Cover, Inches	5	6	8
Shipping Weight Complete, Pounds	1300	1800	2300

***The time required for melting** will vary with the kind of metal being melted and the speed with which the furnace is charged and poured. A furnace used continually every day or kept in constant use will melt quicker than a furnace only used intermittently.

The quantity of fuel oil required will depend on the kind of metal being melted, the speed with which the furnace is charged and poured, and the quality of oil used. 1½ to 2½ gallons of oil per 100 pounds of brass is a fair average.

Standard Equipment consists of furnace complete with crucible, low pressure air type of oil burner, air cock and globe valve for the oil line, fire arrester, and connecting unions.

NOTE: The efficient and satisfactory operation of a furnace depends as much upon the oil burner and the oil burning system behind the burner as upon the construction of the furnace itself. Therefore we cannot guarantee the satisfactory operation of this furnace unless used in connection with an oil burning system which will supply oil and air to the burner in sufficient volume and under an automatically regulated pressure, free from pulsations. 1½ pounds air pressure and about 5 pounds oil pressure are most satisfactory and economical to produce.

The pressure of air and volume available (cubic feet per minute), must be stated when ordering.

For Complete Oil Burning Systems See Bulletins No. 2520, 2555 and 2556.

The furnace is charged through with a 10" hole in the center of the top. This hole is fitted with a fire clay cover which locks in position when raised and can be swung to either side for charging. The cover tilts with the furnace when pouring.

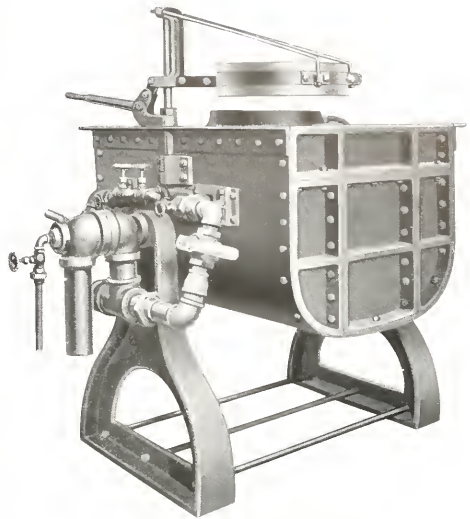
The usual practice is to either charge the furnace by means of a platform built up at the side or behind the furnace, or from an overhead structure. The metal is usually skimmed from the pouring ladle.

A worm gear arrangement is used for tilting which automatically locks the furnace in any desired position, thereby avoiding the necessity of a brake.

The design of the burner ports, furnace vent, lining, and oil burners is based on scientific principles correctly applied so that when this furnace is used in connection with a properly selected and installed oil burning system, an exceptionally low consumption of fuel and perfect combustion of the oil are realized.

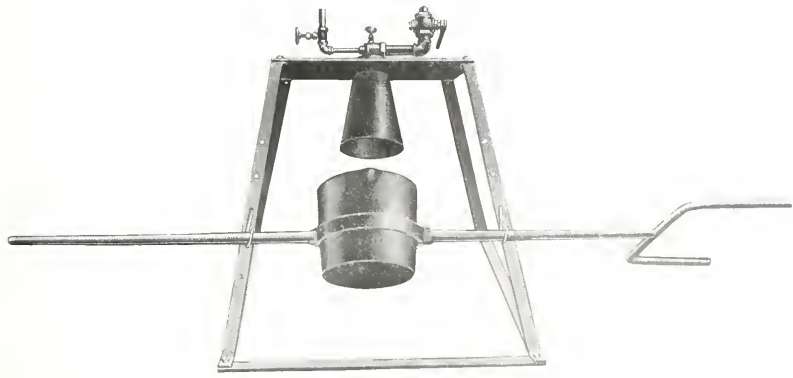
CONSTRUCTION:

The shell of the furnace is constructed of 1 1/4" open hearth steel of the best grade, heavily reinforced with angle irons. The front and back of the furnace are of cast iron heavily ribbed and made in small sections bolted together. In this way any danger is avoided of cracking or warping the shell. The legs, lid lifting arrangement, etc., are all of cast iron. The worm wheel is of special gear iron and the worm of machined steel.



CUT NO. 3035 FURNACE
Showing Cover Raised And Swung to One Side for Charging

The lining is 7" thick and made of a very high grade of fire clay tile in simple shapes and standard fire brick. A layer of high temperature insulating cement is placed between the lining and the shell. Standard fire brick may be used almost throughout in lining this furnace or the bottom may be made up on the job with a carbo-sand mixture. However the special tile lining will give exceptionally good service and requires much less labor and skill to re-line the furnace.



CUT. NO. 3085 LADLE HEATER

Standard Sizes and Specifications

Cut No. 3035 Wayne Non-Crucible Type Melting Furnace

Size No. of Furnace.....	3	6
Melting Capacity, Pounds Brass.....	350 to 550	550 to 800
*Average Heats of Brass Per Day.....	6 to 10	5 to 9
Floor Space, Front to Back, Inches.....	56	66
Floor Space, Right to Left, Inches.....	80	80
Height to Cover, Inches.....	51	51
Air Pipe Connections, Inches.....	3	3
Oil Pipe Connections, Inches.....	1½	1½
Air Volume Required, Cubic Feet Per Minute.....	400	500
Shipping Weight Complete, Pounds.....	5500	6500

*The time required for melting will vary with the kind of metal being melted and the speed with which the furnace is charged and poured. A furnace used continually every day or kept in constant use will melt quicker than a furnace only used intermittently.

The quantity of fuel oil required will depend on the kind of metal being melted, the speed with which the furnace is charged and poured, and the quality of oil used. 1½ to 2½ gallons of oil per 100 pounds of brass is a fair average.

Standard Equipment consists of furnace complete, low pressure air type of oil burners, combination air and oil swing joint, air cocks and globe valves for the oil line, and connecting unions.

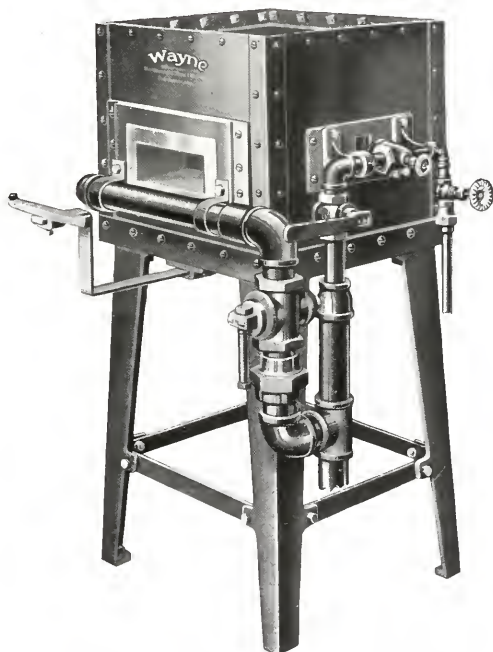
NOTE: We cannot guarantee the satisfactory operation of this furnace unless used in connection with a properly installed Oil Burning System which shall deliver the oil and air to the burners in sufficient volume and under a constant and automatically regulated pressure, free from pulsations. An air pressure of 1 to 2 pounds (1½ pounds best) and an oil pressure of 5 pounds or more must be used.

For Complete Oil Burning Systems See Bulletins No. 2520 and 2556



Oil Burning Furnaces for Forging and Welding

BULLETIN No. 3215



Cut No. 3215 Forging and Welding Furnace

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

CUT NO. 3215—GENERAL DESCRIPTION

This Wayne Oil Burning Furnace is designed for forging, welding, bull-dozing, dressing of tools, heating drill steel, etc. It is substantial in construction and its design is based on scientific principles so that when used in connection with the proper burner and oil burning system, perfect combustion of the oil will be obtained and quick even heats will be secured at a minimum fuel consumption.

The combustion takes place beneath the arched roof of the heating chamber or directly over the work. This chamber is so designed that the heat is very evenly spread throughout the entire chamber. A movable support is provided in front of the furnace for holding long bars, etc. A blast pipe is placed directly in front of the mouth to protect the operator from the heat.

Any size of this type of furnace may be equipped with either the Wayne Adjustable or Non-Adjustable Type Oil Burner or our Combination Gas and Oil Burner for use with either high or low pressure air.

CONSTRUCTION: The shell and top of the furnace are constructed of open hearth sheet steel heavily reinforced with angle irons. The base and legs are of cast iron. All openings are also reinforced with cast iron.

A very high grade of fire clay tile in simple shapes and standard fire brick are used in lining the furnace. Between the shell and fire clay lining a layer of high temperature insulating cement is used.

The use of a sheet steel shell affords maximum life for the furnace as this material will take up the expansion and contraction of the lining without bulging or cracking as is often the case with furnaces constructed entirely of cast iron.

STANDARD SIZES AND SPECIFICATIONS

Cut No. 3215 Forging and Welding Furnaces.

Size No.	DIMENSIONS — INCHES			Floor Space, Inches	Approximate Shipping Weight, Pounds
	*Depth Heating Chamber	MOUTH			
		Right to Left	Height		
3	9	9	3	25 x 27	850
5	10	12	3	28 x 30	1175
6	12	12	3	30 x 30	1400
8	12	15	4	30 x 33	1550
9	15	15	4	33 x 33	2050
11	15	18	4	33 x 36	2150
12	18	18	4	36 x 36	2400

*The depth of the heating chamber given includes only the actual working space. It does not include distance from heating chamber to edge of mouth.

NOTE: The efficient and satisfactory operation of a furnace depends as much upon the oil burner and the oil burning system behind the burner as upon the construction of the furnace itself. Therefore we cannot guarantee the satisfactory operation of this furnace unless used in connection with an oil burning system which will supply oil and air to the burner in sufficient volume and under an automatically regulated pressure, free from pulsations. One to two pounds air pressure and about five pounds oil pressure are most satisfactory and economical to produce.

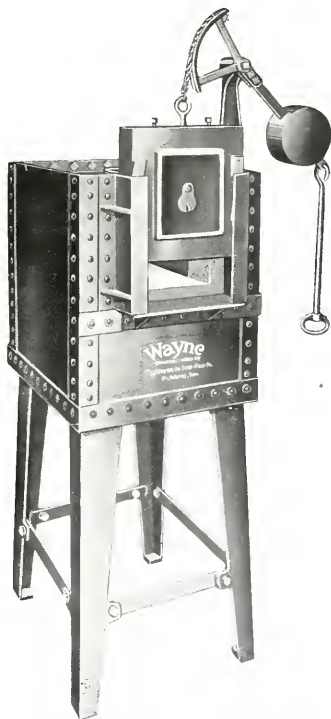
The pressure of air and volume available (cubic feet per minute) must be stated when ordering.

See Bulletins No. 2520 and No. 2556 for Information on Complete Oil Burning Systems.



Oil Burning Oven or Semi-Muffle Type Furnaces

BULLETIN No. 3255



Cut No. 3255 Oven Type Furnace

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

**Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating**

CUT NO. 3255—GENERAL DESCRIPTION

This Wayne Oil Burning Furnace is designed for hardening, tempering, annealing and case hardening of dies, tools, reamers, cutters, taps, springs, cutlery, screws etc. It is substantial in construction and its design is based on scientific principles so that when used in connection with the proper burner and oil burning system perfect combustion of the oil will be obtained and correct temperatures, easily and quickly regulated, will be secured at a minimum fuel consumption.

The combustion takes place beneath the hearth, or floor, of the heating chamber. The hot gases then pass up through slots at each side of the hearth into the heating chamber. Vent holes are placed in the top of the furnace. The combustion chamber beneath the hearth, the slots at each side of the hearth, the heating chamber and the vents in the top of the furnace are all so designed that the hot gases are spread evenly throughout the entire working space—the most essential point in a furnace of this type.

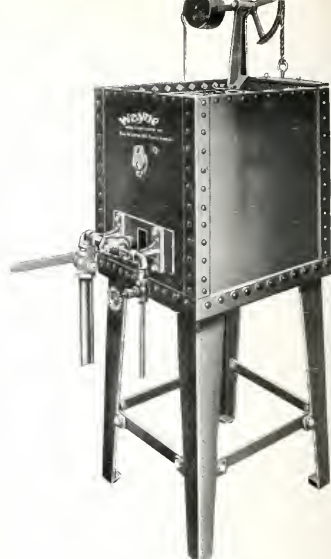
A counterbalanced door, peep hole in the door and pyrometer hole are provided.

This type of furnace is furnished standard with either the Wayne Adjustable Type Oil Burner or our Combination Gas and Oil Burner, for use with either high or low pressure air. With either of these burners the temperature can be accurately maintained or quickly increased or decreased by simply turning the proper valve, thereby making overheating or oxidation impossible.

CONSTRUCTION: The shell and top of the furnace are constructed of open hearth sheet steel heavily reinforced with angle irons. The base, legs, door frame and door are of cast iron. All openings are also reinforced with cast iron.

A very high grade of fire clay tile in simple shapes and standard fire brick are used in lining the furnace. Between the lining and fire clay a layer of high temperature insulating cement is used.

The use of a sheet steel shell affords maximum life for the furnace, as this material will take up the expansion and contraction of the lining without bulging or cracking, as is often the case with furnaces constructed entirely of cast iron.



CUT NO. 3255
Back View Showing Oil Burner

STANDARD SIZES AND SPECIFICATIONS—CUT NO. 3255—OVEN TYPE FURNACES

Size No.	Dimensions—Inches			Floor Space Inches	Approximate Shipping Weight Pounds
	*Depth Heating Chamber	Mouth			
		Width	Height		
1	12	8	6 $\frac{1}{2}$	23x28	500
3	12	10	6 $\frac{1}{2}$	25x28	850
4	15	10	6 $\frac{1}{2}$	25x31	1150
6	18	10	6 $\frac{1}{2}$	25x34	1550
8	15	12	6 $\frac{1}{2}$	27x31	1200
9	18	12	6 $\frac{1}{2}$	27x34	1650
10	24	12	6 $\frac{1}{2}$	27x40	1800
12	24	15	6 $\frac{1}{2}$	30x40	2000

*The depth of the heating chamber given includes only the actual working space. It does not include distance from heating chamber to edge of door.

NOTE: The efficient and satisfactory operation of a furnace depends as much upon the oil burner and the oil burning system behind the burner as upon the construction of the furnace itself. Therefore, we cannot guarantee the satisfactory operation of this furnace unless used in connection with an oil burning system which will supply oil and air to the burner in sufficient volume and under an automatically regulated pressure, free from pulsations. One to two pounds air pressure and about five pounds oil pressure are most satisfactory and economically produced.

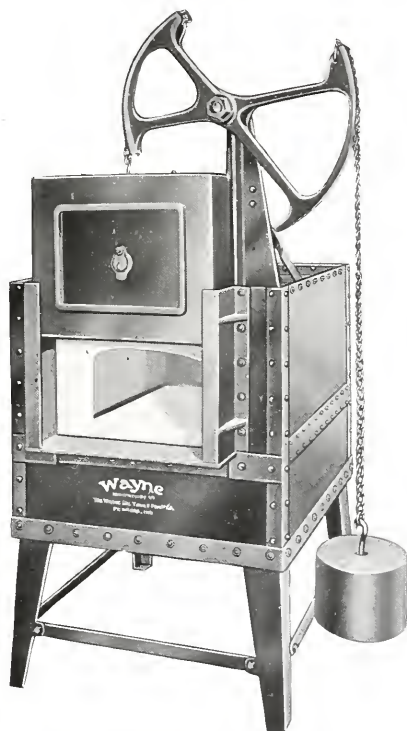
The pressure of air and volume available (cubic feet per minute) must be stated when ordering.

See Bulletins No. 2520 and No. 2556 For Information on Complete Oil Burning Systems.



Oil Burning Oven or Semi-Muffle Type Furnaces

BULLETIN No. 3260



Cut No. 3260 Oven Type Furnace

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

CUT NO. 3260—GENERAL DESCRIPTION

These Wayne Oil Burning Furnaces are designed for hardening, tempering, annealing and case hardening of dies, tools, reamers, cutters, taps, springs, cutlery, screws, etc. They are substantial in construction and the design is based on scientific principles so that when used in connection with the proper burners and oil burning system perfect combustion of the oil will be obtained and correct temperatures, easily and quickly regulated, will be secured at a minimum fuel consumption.

The combustion takes place beneath the hearth, or floor, of the heating chamber. The hot gases then pass up through slots at each side of the hearth into the heating chamber. Vent holes are placed in the top of the furnace. The combustion chamber beneath the hearth, the slots at each side of the hearth, the heating chamber and the vents in the top of the furnace are all so designed that the hot gases are spread evenly throughout the entire working space—the most essential point in a furnace of this type.

A counterbalanced door, peep hole in the door and pyrometer hole are provided.

This type of furnace is furnished standard with either the Wayne Adjustable Type Oil Burner or our Combination Gas and Oil Burner, for use with either high or low pressure air. With either of these burners the temperature can be accurately maintained or quickly increased or decreased by simply turning the proper valve, thereby making overheating or oxidation impossible.

CONSTRUCTION: The shell and top of the furnace are constructed of open hearth plate steel heavily reinforced with angle irons. The base, legs, door frame and door are of cast iron. All openings are also reinforced with cast iron.

The walls of these furnaces are exceptionally thick (7") and are composed of 4½" of the best grade of standard fire brick and 2½" of asbestos insulating cement. The roof is of standard arch brick, covered with insulating cement.

The use of a sheet steel shell affords maximum life for the furnace, as this material will take up the expansion and contraction of the lining without bulging or cracking, as is often the case with furnaces constructed entirely of cast iron.

STANDARD SIZES AND SPECIFICATIONS—CUT NO. 3260—OVEN TYPE FURNACES

Size No.	Dimensions—Inches			Floor Space Inches	Approx. Shipping Weight Pounds	Oil Burners Cut No. 3625	
	*Depth Heating Chamber	Month				No. of Burners	Size No.
		Width	Height				
2	24	18	8	36x37	2600	1	4
4	30	18	8	36x43	2850	2	3
6	36	24	12	41x49	4250	2	3
8	36	36	12	53x49	4400	2	3
10	42	36	12	53x55	4750	2	3
12	60	36	18	53x73	4900	2	4

*The depth of the heating chamber given includes only the actual working space. It does not include distance from heating chamber to edge of door.

NOTE: The efficient and satisfactory operation of a Furnace depends as much upon the oil burner and the oil burning system behind the burner as upon the construction of the furnace itself. Therefore, we cannot guarantee the satisfactory operation of this furnace unless used in connection with an oil burning system which will supply oil and air to the burner in sufficient volume and under an automatically regulated pressure, free from pulsations. One to two pounds air pressure and about five pounds oil pressure are most satisfactory and economically produced.

The pressure of air and volume available (cubic feet per minute) must be stated when ordering.

See Bulletins No. 2520, No. 2555 and No. 2556 For Information on Complete Oil Burning Systems.



Circular Pot Type, Oil Burning Furnaces

BULLETIN No. 3310



CUT NO. 3335—POT FURNACE

Back View Showing Wayne Combination Gas and Oil Burner

Wayne Circular Pot Type Furnaces are designed in the Cut 3335 Type for Lead Hardening and in the Cut 3310 Type for Cyanide Hardening, Oil Tempering or Blueing.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

**Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating**



CUT NO. 3310
Pot Furnace With Hood

Cut 3335-3310—General Description

Wayne Circular Pot Furnaces embody many improvements and advantages. They are of very substantial construction. Their design is based on scientific principles resulting in perfect combustion of the fuel, correct temperatures easily and quickly regulated, and minimum fuel consumption.

The combustion takes place at the bottom of the heating chamber far below the crucible. There is no direct blast of flame against or at the side of the crucible. The hot gases then pass up around the crucible, heating it evenly throughout and affording maximum crucible life.

A slag or lighting hole is placed at the front of the furnace for cleaning or lighting the burner.

BURNER—This furnace is furnished standard with the Wayne Low Pressure Type Oil Burner or may be fitted special with the Wayne Combination Gas and Oil Burner for use with either Natural or Artificial Gas and Oil. With either of these burners the temperature can be accurately maintained or quickly increased or decreased by simply turning the proper valves.

CRUCIBLE—Crucibles are all constructed of Cast Steel, which affords longer life and better operating conditions than either cast iron or pressed steel pots. The crucible rests on a high fire clay stand and is flanged out at the top, resting evenly on the top of the furnace.

CONSTRUCTION—The shell of the furnace is constructed of heavy plate steel. The base, top, legs and trimmings are of cast iron.

The furnace walls are 6 inches thick. A very high grade of standard fire brick is used. This lining is coated on the inside with a High Temperature Cement, thereby greatly prolonging its life. Between the lining and fire clay a thick layer of Insulating Cement is used which reduces to the minimum loss of heat by radiation.

The hood supplied with the Cut No. 3310 Furnace is constructed of heavy sheet steel reinforced and provided with a sliding door.

Cut No. 3335-3310 Standard Sizes and Specifications

Size No.	Dimensions Crucible		Floor Space, Inches		Height to Top of Hood, Inches	Approximate Shipping Weight, Pounds	Size No. Burner Cut 3625
	Depth, Inches	Diameter, Inches	Height	Width			
2	8	6	30	23	56	550	1
4	11	6	33	23	59	625	1
6	10	8	32	26	58	950	1
8	14	10	37	28	63	1225	1
10	14	15	37	33	65	1425	2
12	18	17	41	35	76	1675	2

NOTE: The efficient and satisfactory operation of a furnace depends as much upon the oil burner and the oil burning system behind the burner as upon the construction of the furnace itself. Therefore, we cannot guarantee the satisfactory operation of this furnace unless used in connection with an oil burning system which will supply oil and air to the burner in sufficient volume and under an automatically regulated pressure, free from pulsations. $1\frac{1}{2}$ pounds air pressure and about 5 pounds oil pressure are most satisfactory and economically produced.

The pressure of air and volume available (cubic feet per minute) must be stated when ordering.

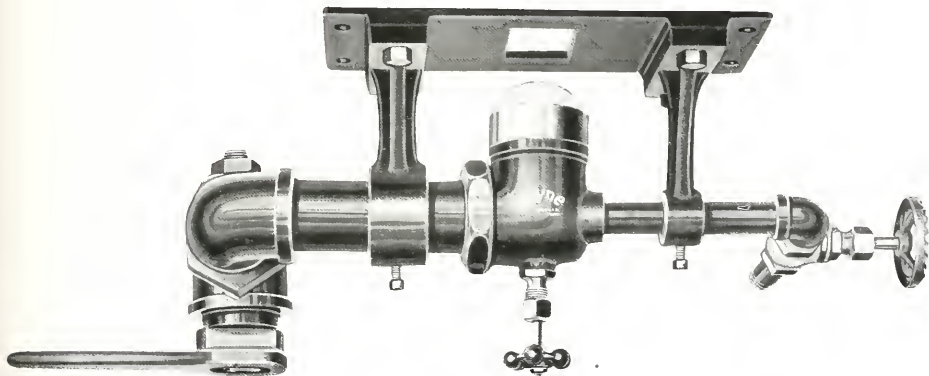
See Bulletins No. 2520, No. 2555 and No. 2556 For Information on Complete Oil Burning Systems

Wayne

Oil Burners

For Use With Low Pressure Air

BULLETIN No. 3625



Cut No. 3625 Oil Burner.

The Cut No. 3625 Oil Burner is of the Low Pressure Air Open Flame Type. In design it embodies the scientific principles underlying the proper burning of oil. In construction it is simple, substantial, and mechanically correct. There are no complicated parts. It will stand up to its work and maintain its efficiency year in and year out.

This burner may be used for burning the general run of Fuel Oil, Crude Oil, Kerosine and the heavy Mexican Oils. It is made in eight standard sizes with capacities varying from one-tenth of a gallon to twenty gallons per hour.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

CUT No. 3625 GENERAL DESCRIPTION

This Oil Burner is designed for operation in connection with an oil burning system that will supply oil to the burner under a pressure just sufficient to insure a steady and even flow and compressed air, in sufficient volume, under a pressure of 8 ounces to 2 pounds per square inch. However, in ordering, the pressure of air to be used must be stated and this pressure can not be varied at any time.

In the majority of installations, the most satisfactory and economical results have been obtained by using a system that supplies oil to the burner under a pressure of about 5 pounds per square inch and air under a pressure of $11\frac{1}{2}$ pounds per square inch. A higher pressure of either air or oil is neither necessary nor economical.

Operation: The burner is attached to the furnace by means of substantial cast iron brackets, the tip of the burner being held a short distance from the burner hole in the furnace. The burner is simply the means of projecting the oil through this burner hole into the furnace, or combustion chamber, in the form of a perfectly atomized spray.

The oil supply enters at one side of the burner and the air supply at the opposite side. The oil passes through an inner tube and the air through the outer tube, or main casing, to the mouth of the burner. The mouth, or tip, of the burner is so shaped that the action of the air atomizes the oil as it leaves the burner and thoroughly mixes with the atomized spray which has been produced. The rate of flow of oil is accurately regulated by a special needle valve built in the head of the burner.

Low Operating Cost: With this open flame type of burner, only sufficient compressed air is required to atomize the oil. The action of the compressed air from the burner tip as it discharges into the furnace through the burner hole, draws in sufficient free air around the burner to complete combustion. This free air amounts to approximately 40% of the total volume of air necessary for complete combustion. It is therefore necessary to compress only about 60% of the volume of air required. The cost of compressing air is much larger than is generally recognized. It has also been found in actual practice that just as complete combustion is secured and the fire is just as easily regulated as with the closed flame type of burner, through which all of the air for combustion must be pumped.

Standard Equipment: The standard equipment for each burner includes a needle valve built in the head of the burner, a globe valve for the oil supply line, iron cock with handle for the air line, cast iron burner boss, and necessary brackets for attaching the burner to the burner boss.

Data Required: In order to quote intelligently, and specify the proper size of burner for your requirements, it is essential that we be furnished with answers to as many of the following questions as is possible:

1. If you wish to install a new, complete oil burning system, answer the questions in Bulletin No. 2520 covering complete systems.
2. If you have metal melting, forging or heat treating furnaces now installed and which you wish to equip with our burners, state kind of fuel you are now using. If oil, state whether light or heavy. If gas, state whether natural gas, artificial city gas or producer gas. Give B. T. U. value if possible. If hard or soft coal or coke, state which.
3. State maximum quantity of fuel consumed per hour at each fire—gallons of oil, cubic feet of gas or pounds of coal or coke.
4. Give the dimensions of the working space of each furnace or fire, and describe as clearly as possible the construction of the furnace—give name or make if possible.
5. Describe as clearly as possible the operation being performed at each fire. Give speed of production desired in each case.
6. Have you any compressed air available ($11\frac{1}{2}$ pounds per square inch is best). If so, state volume and pressure (number of cubic feet per minute and number of ounces or pounds per square inch).
7. Have you a source of oil supply available? If so, state whether it is gravity, air pressure or pump feed. Describe whichever system is used.

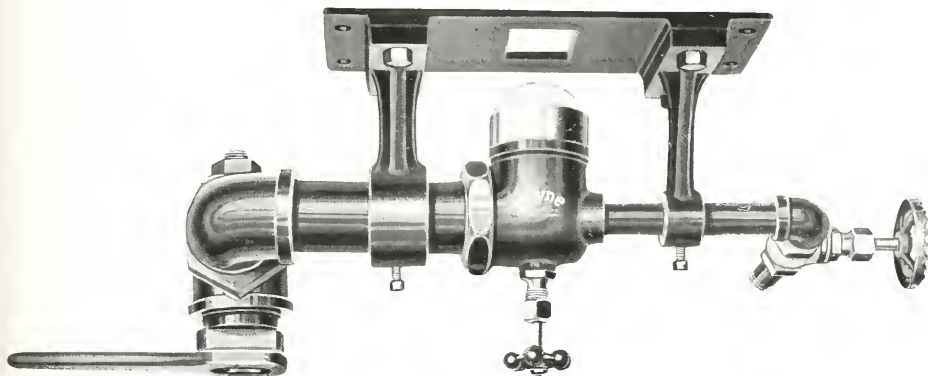
SEE BULLETIN No. 2520 FOR INFORMATION ON COMPLETE OIL BURNING SYSTEMS

Wayne

Oil Burners

For Use With Low Pressure Air

BULLETIN No. 3625



Cut No. 3625 Oil Burner.

The Cut No. 3625 Oil Burner is of the Low Pressure Air Open Flame Type. In design it embodies the scientific principles underlying the proper burning of oil. In construction it is simple, substantial, and mechanically correct. There are no complicated parts. It will stand up to its work and maintain its efficiency year in and year out.

This burner may be used for burning the general run of Fuel Oil, Crude Oil, Kerosine and the heavy Mexican Oils. It is made in eight standard sizes with capacities varying from one-tenth of a gallon to twenty gallons per hour.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

CUT No. 3625 GENERAL DESCRIPTION

This Oil Burner is designed for operation in connection with an oil burning system that will supply oil to the burner under a pressure just sufficient to insure a steady and even flow and compressed air, in sufficient volume, under a pressure of 8 ounces to 2 pounds per square inch. However, in ordering, the pressure of air to be used must be stated and this pressure can not be varied at any time.

In the majority of installations, the most satisfactory and economical results have been obtained by using a system that supplies oil to the burner under a pressure of about 5 pounds per square inch and air under a pressure of $1\frac{1}{2}$ pounds per square inch. A higher pressure of either air or oil is neither necessary nor economical.

Operation: The burner is attached to the furnace by means of substantial cast iron brackets, the tip of the burner being held a short distance from the burner hole in the furnace. The burner is simply the means of projecting the oil through this burner hole into the furnace, or combustion chamber, in the form of a perfectly atomized spray.

The oil supply enters at one side of the burner and the air supply at the opposite side. The oil passes through an inner tube and the air through the outer tube, or main casing, to the mouth of the burner. The mouth, or tip, of the burner is so shaped that the action of the air atomizes the oil as it leaves the burner and thoroughly mixes with the atomized spray which has been produced. The rate of flow of oil is accurately regulated by a special needle valve built in the head of the burner.

Low Operating Cost: With this open flame type of burner, only sufficient compressed air is required to atomize the oil. The action of the compressed air from the burner tip as it discharges into the furnace through the burner hole, draws in sufficient free air around the burner to complete combustion. This free air amounts to approximately 40% of the total volume of air necessary for complete combustion. It is therefore necessary to compress only about 60% of the volume of air required. The cost of compressing air is much larger than is generally recognized. It has also been found in actual practice that just as complete combustion is secured and the fire is just as easily regulated as with the closed flame type of burner, through which all of the air for combustion must be pumped.

Standard Equipment: The standard equipment for each burner includes a needle valve built in the head of the burner, a globe valve for the oil supply line, iron cock with handle for the air line, cast iron burner boss, and necessary brackets for attaching the burner to the burner boss.

Data Required: In order to quote intelligently, and specify the proper size of burner for your requirements, it is essential that we be furnished with answers to as many of the following questions as is possible:

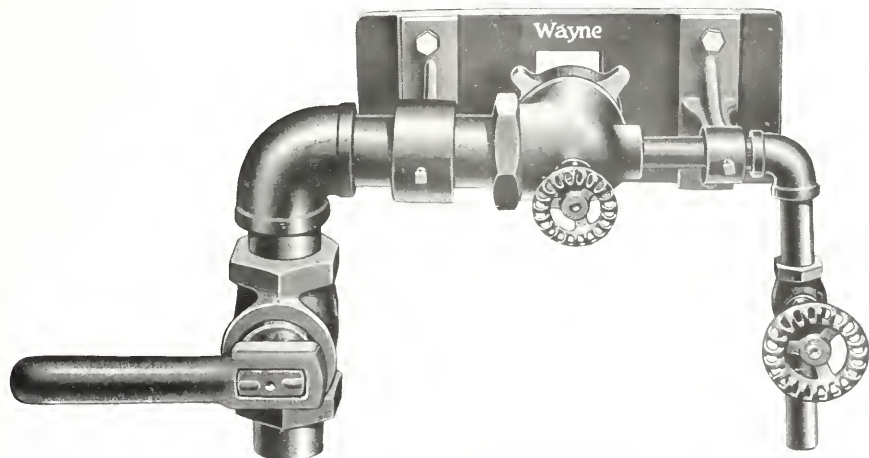
1. If you wish to install a new, complete oil burning system, answer the questions in Bulletin No. 2520 covering complete systems.
2. If you have metal melting, forging or heat treating furnaces now installed and which you wish to equip with our burners, state kind of fuel you are now using. If oil, state whether light or heavy. If gas, state whether natural gas, artificial city gas or producer gas. Give B. T. U. value if possible. If hard or soft coal or coke, state which.
3. State maximum quantity of fuel consumed per hour at each fire—gallons of oil, cubic feet of gas or pounds of coal or coke.
4. Give the dimensions of the working space of each furnace or fire, and describe as clearly as possible the construction of the furnace—give name or make if possible.
5. Describe as clearly as possible the operation being performed at each fire. Give speed of production desired in each case.
6. Have you any compressed air available ($1\frac{1}{2}$ pounds per square inch is best). If so, state volume and pressure (number of cubic feet per minute and number of ounces or pounds per square inch).
7. Have you a source of oil supply available? If so, state whether it is gravity, air pressure or pump feed. Describe whichever system is used.

SEE BULLETIN No. 2520 FOR INFORMATION ON COMPLETE OIL BURNING SYSTEMS



Adjustable Type Oil Burners For Use With Low Pressure Air

BULLETIN No. 3630



Cut No. 3630 Oil Burner.

The Cut No. 3630 Oil Burner is of the Low Pressure Air Open Flame Type. In design it embodies the scientific principles underlying the proper burning of oil. In construction it is simple, substantial, and mechanically correct. There are no complicated parts. It will stand up to its work and maintain its efficiency year in and year out.

This burner may be used for burning the general run of Fuel Oil, Crude Oil, Kerosene and the heavy Mexican Oils. It is made in 6 standard sizes with capacities varying from 1 to 20 gallons per hour.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems

Furnaces for Metal Melting, Forging and Heat Treating

Cut No. 3630---General Description

This Oil Burner is designed for operation in connection with an oil burning system that will supply oil and air in sufficient volume to the burner under a constant and automatically regulated pressure, free from pulsations.

In the majority of installations, the most satisfactory and economical results have been obtained by using a system that supplies oil to the burner under a pressure of about 5 pounds per square inch and air under a pressure of $1\frac{1}{2}$ pounds per square inch. A higher pressure of either air or oil is neither necessary nor economical.

Operation: The burner is attached to the furnace by means of substantial cast iron brackets, the tip of the burner being held a short distance from the burner hole in the furnace. The burner is simply the means of projecting the oil through this burner hole into the furnace, or combustion chamber, in the form of a perfectly atomized spray.

The oil supply enters at one side of the burner and the air supply at the opposite side. The oil passes through an inner tube and the air through the outer tube, or main casing, to the mouth of the burner. The mouth, or tip, of the burner is so shaped that the action of the air atomizes the oil as it leaves the burner and thoroughly mixes with the atomized spray which has been produced. The rate of flow of oil is accurately regulated by a special needle valve built in the head of the burner.

Adjustable Tip: The tip of this burner is so constructed that by turning the adjustable tip to the right or left the volume of air delivered may be increased or decreased without either increasing or decreasing the pressure of air required for atomizing the oil. By the proper adjustment of this tip, and the oil needle valve, a wide range of temperatures can be obtained, the proper mixture of air and oil secured, and the maximum air pressure maintained at the tip of the burner at all times. This change in volume of air can not be secured with a cock or valve in the air line without also changing the pressure and so affecting the atomizing qualities of the burner.

Low Operating Cost: With this open flame type of burner, only sufficient compressed air is required to atomize the oil. The action of the compressed air from the burner tip as it discharges into the furnace through the burner hole, draws in sufficient free air around the burner to complete combustion. This free air amounts to approximately 40% of the total volume of air necessary for complete combustion. It is therefore necessary to compress only about 60% of the volume of air required. The cost of compressing air is much larger than is generally recognized. It has also been found in actual practice that just as complete combustion is secured and the fire is just as easily regulated as with the closed flame type of burner, through which all of the air for combustion must be pumped.

Standard Equipment: The standard equipment for each burner includes a needle valve built in the head of the burner, a globe valve for the oil supply line, iron cock with handle for the air line, cast iron burner boss, and necessary brackets for attaching the burner to the burner boss.

Data Required: In order to quote intelligently, and specify the proper size of burner for your requirements, it is essential that we be furnished with answers to as many of the following questions as is possible:

1. If you wish to install a new, complete oil burning system, answer the questions in Bulletin No. 2520 covering complete systems.

2. If you have metal melting, forging or heat treating furnaces now installed and which you wish to equip with our burners, state kind of fuel you are now using. If oil, state whether light or heavy. If gas, state whether natural gas, artificial city gas or producer gas. Give B. T. U. value if possible. If hard or soft coal or coke, state which.

3. State maximum quantity of fuel consumed per hour at each fire—gallons of oil, cubic feet of gas or pounds of coal or coke.

4. Give the dimensions of the working space of each furnace or fire, and describe as clearly as possible the construction of the furnace—give name or make if possible.

5. Describe as clearly as possible the operation being performed at each fire. Give speed of production desired in each case.

6. Have you any compressed air available ($1\frac{1}{2}$ pounds per square inch is best). If so, state volume and pressure (number of cubic feet per minute and number of ounces or pounds per square inch).

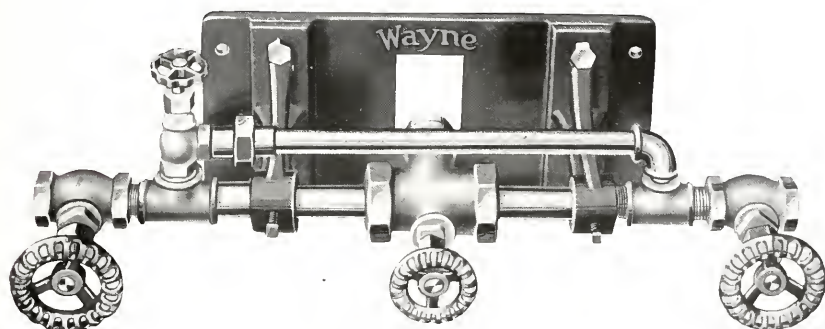
7. Have you a source of oil supply available? If so, state whether it is gravity, air pressure or pump feed. Describe whichever system is used.

SEE BULLETIN No. 2520 FOR INFORMATION ON COMPLETE OIL BURNING SYSTEMS

Wayne

Oil Burners For Use With Steam or High Pressure Air

BULLETIN No. 3635



Cut No. 3635 Oil Burner

The Cut No. 3635 Oil Burner is constructed for use with steam, or high pressure air, as the atomizing agent. It is designed especially for application to power boilers, or furnaces, etc., where the installation of such a burner might be advisable.

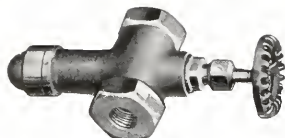
This burner will efficiently burn the general run of Fuel Oil, Crude Oil, Kerosene and the heavy Mexican Oils. In construction it is simple, substantial, and mechanically correct. There are no complicated working parts. It will stand up to its work and maintain its efficiency year in and year out.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating



Cut No. 3635 General Description

This Oil Burner is designed for operation in connection with a properly installed oil burning system which shall meet the following conditions:

1st: Supply dry steam to the burner at a pressure of 25 to 50 pounds, or compressed air at a pressure of 25 to 125 pounds. (The variation in pressures depending on conditions.)

2nd: Supply oil to the burner in a clean, and heated condition if necessary, and under a steady and uniform pressure of 20 to 50 pounds. (The variation in pressures depending on conditions.)

OPERATION: The burner boss is attached to a sheet steel plate placed over the opening to the fire box or combustion chamber. The tip of the burner is held in its proper place by means of two substantial cast iron brackets bolted to the burner boss. The burner is simply the means of projecting the oil through the hole in the burner boss into the fire box or combustion chamber in the form of a perfectly atomized spray.

The oil enters at the side of the burner and the steam (or compressed air) at the opposite side. The oil passes through an inner tube, and the atomizing agent through the outer tube, or main casing, to the tip of the burner. The mouth, or tip of the burner is so shaped that the action of the steam or compressed air atomizes the oil as it leaves the burner and thoroughly mixes with the atomized spray which has been produced. The rate of flow of the oil is accurately regulated by a special needle valve built in the head of the burner.

This burner is fitted with a steam by-pass with valve. Should the oil carbonize in the oil tube, or become otherwise clogged at this point, the foreign matter may be blown out and the oil tube cleaned by simply closing the globe valve in the oil line and opening the by-pass valve, thereby allowing the steam to blow out through the oil tube.

FIRE BOX CONSTRUCTION: When the fire box has been properly designed, a fan shaped flame is produced. However, it must be remembered that the proper design of the fire box for use with oil fuel and the oil burning system behind the burner are just as important as the design of the burner itself if efficient results are to be obtained. Therefore, we can only guarantee the proper operation of this burner when installed in accordance with our directions.

STANDARD EQUIPMENT: The standard equipment for each burner includes a needle valve built in the head of the burner, a globe valve for the oil supply line, a globe valve for the steam (or air) supply line, brass by-pass complete with valve, cast iron burner boss, and necessary brackets for attaching the burner to the burner boss.

DATA REQUIRED: In order to quote intelligently and specify the proper size of burner for your requirements, it is essential that we be furnished with answers to as many of the following questions as is possible:

- A: If you wish to install a new complete oil burning system for application to power boilers, answer the questions in bulletin No. 2530.
 - B: If you wish to install oil burners only or change your present burners to those of our make for operation with power boilers, answer questions Nos. 1, 2, 3, 4, 5, 8 and 9.
 - C: If you wish to use this type of burner in connection with industrial furnaces, or other uses than power boilers, answer questions Nos. 4, 5, 6, 7, 8 and 9.
1. How many boilers do you wish to fire; state rated horsepower of each?
 2. Give name or make and type of each boiler and state its present efficiency, if known.
 3. What steam pressure have you available?
 4. What kind of fuel are you using now? If coal, state whether hard or soft; if oil, state its specific gravity; if gas, state whether natural gas, artificial city gas, or producer gas. Give B. T. U. value of fuel if possible.
 5. State maximum quantity of fuel consumed at each fire per hour—pounds of coal, gallons of oil, cubic feet of gas.
 6. Give the dimensions of the working space of each fire, and describe as clearly as possible the construction of the furnace. Give name or make if possible.
 7. Describe as clearly as possible the operation being performed at each fire. Give speed of production desired in each case.
 8. Have you any compressed air available? If so, state volume (cubic feet) and pressure (pounds per square inch).
 9. Have you a source of oil supply available? If so, state whether it is gravity, air pressure, or pump feed. Describe whichever system is used.

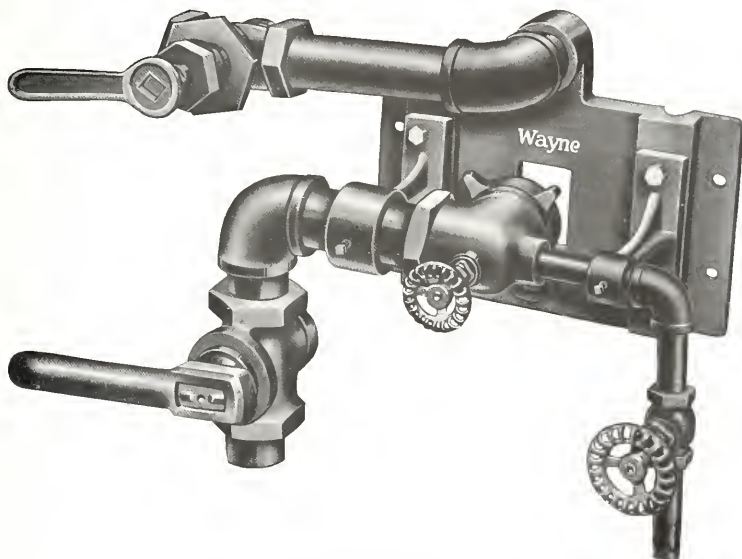
NOTE: This burner cannot be used in connection with low pressure heating boilers. For such boilers the low pressure air type of burner and oil burning system should be used.

**SEE BULLETIN NO. 2530 FOR INFORMATION ON COMPLETE
OIL BURNING SYSTEM FOR USE WITH POWER BOILERS**



Combination Gas and Oil Burners

BULLETIN No. 3640



CUT NO. 3640
COMBINATION GAS AND OIL BURNER

The Cut No. 3640 Combination Gas and Oil Burner is designed for use in connection with industrial furnaces whenever it is desired to burn either gas or oil at different times or burn gas and oil together at the same time. This is accomplished by simply opening or closing the proper valves.

This burner will efficiently burn Artificial or Natural Gas or the general run of Fuel Oil, Kerosene and the heavy Mexican Oils. It is made in 6 standard sizes with capacities on oil varying from 1-10 of a gallon to 10 gallons per hour. Any quantity up to 650 cubic feet of natural gas or 1,000 cubic feet of artificial gas per hour may be burned.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

Cut No. 3640---General Description

The Wayne Combination Gas and Oil Burner consists principally of one of our standard adjustable or non-adjustable type oil burners and a special burner boss. In fact, to convert any standard size of oil burner to a combination gas and oil burner it is simply necessary to change the burner boss; the oil burner body, brackets and valves being the same in either case. The same blast of air, through the one pipe, is used for burning either the gas or oil.

For Gas: The special burner boss used in the combination burner is cored out to allow passage of ample proportion around the burner hole. This passage is fed through a 1½" gas pipe connection at the top. A number of small holes are drilled at an angle through the surface of the hole in the burner boss into the gas passage. The gas is projected through these holes into the furnace in the form of a converging cone and the compressed air from the burner is projected into the flow of gas in the form of a diverging cone. In this way the gas and air are thoroughly mixed and perfect combustion is secured. The correct proportions of gas and air are secured by simply regulating the valve in the gas line and the adjustable air tip of the burner.

For Oil: The oil burner is simply the means of projecting the oil into the furnace in the form of a perfectly atomized spray. The oil enters at one side of the burner and the air supply at the opposite side. The oil passes through an inner tube and the air through the outer tube, or main casing, to the mouth of the burner. The mouth, or tip, of the burner is so shaped that the action of the air atomizes the oil as it leaves the burner and thoroughly mixes with the atomized spray which has been produced. The correct proportions of air and oil are secured by regulating the needle oil valve and the adjustable air tip. With this adjustable air tip it is possible to increase or decrease the volume of air without affecting the pressure of air.

Low Operating Cost: With this open flame type of burner, only sufficient compressed air is required to atomize the oil. The action of the compressed air from the burner tip as it discharges into the furnace through the burner hole, draws in sufficient free air around the burner to complete combustion. This free air amounts to approximately 40% of the total volume of air necessary for complete combustion. It is therefore necessary to compress only about 60% of the volume of air required. The cost of compressing air is much larger than is generally recognized. It has also been found in actual practice that just as complete combustion is secured and the fire is just as easily regulated as with the closed flame type of burner, through which all of the air for combustion must be pumped.

Standard Equipment: The standard equipment for each burner includes the special burner boss with gas valve, standard oil burner, burner brackets, globe valve for oil line and iron cock with handle for the air line.

Note: Satisfactory results can only be secured when the proper size of burner is correctly applied to the furnace and when used in connection with a gas and oil burning systems which will supply gas, oil and air to the burner in sufficient volume and under a constant and automatically regulated pressure, free from pulsations. Gas can be fed at normal pressure, oil at 5 pounds or more, and air at 1 to 2 pounds pressure.

Data Required: In order to quote intelligently, and specify the proper size of burner for your requirements, it is essential that we be furnished with answers to as many of the following questions as is possible:

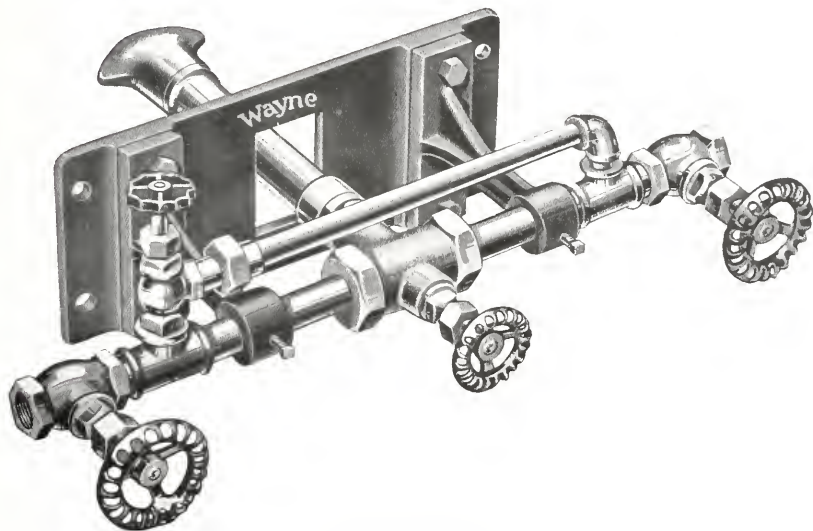
1. If you wish to install a new, complete oil burning system, answer the questions in Bulletin No. 2520 covering complete systems.
2. If you have metal melting, forging or heat treating furnaces now installed and which you wish to equip with our burners, state kind of fuel you are now using. If oil, state whether light or heavy. If gas, state whether natural gas, artificial city gas or producer gas. Give B. T. U. value if possible. If hard or soft coal or coke, state which.
3. State maximum quantity of fuel consumed per hour at each fire—gallons of oil, cubic feet of gas or pounds of coal or coke.
4. Give the dimensions of the working space of each furnace or fire, and describe as clearly as possible the construction of the furnace—give name or make if possible.
5. Describe as clearly as possible the operation being performed at each fire. Give speed of production desired in each case.
6. Have you any compressed air available (1½ pounds per square inch is best). If so, state volume and pressure (number of cubic feet per minute and number of ounces or pounds per square inch).
7. Have you a source of oil supply available? If so, state whether it is gravity, air pressure or pump feed. Describe whichever system is used.

SEE BULLETIN No. 2520 FOR INFORMATION ON COMPLETE OIL BURNING SYSTEMS



Oil Burners For Use With Power Boilers

BULLETN No. 3650



Cut 3650 Oil Burner

The Cut 3650 Oil Burner is especially designed for application to Power Boilers. It is constructed for use with steam as the atomizing agent.

This burner will efficiently burn the general run of Fuel Oil, Crude Oil, Kerosene and the heavy Mexican Oils. In construction it is simple, substantial, and mechanically correct. There are no complicated working parts. It will stand up to its work and maintain its efficiency year in and year out.

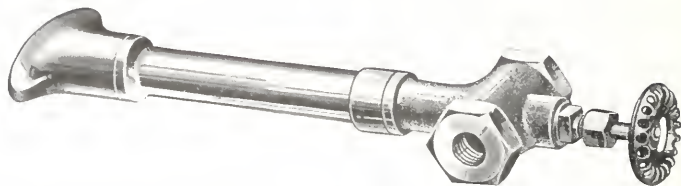
Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

Cut No. 3650 General Description



This Oil Burner is designed for use in connection with an oil burning system which shall meet the following conditions:

First:—Supply dry steam to the burner at a constant pressure of 25 to 100 pounds.

Second:—Supply oil to the burner in a clean, and heated condition if necessary, and under a constant and automatically regulated pressure of 20 to 50 pounds.

Operation: The burner boss is attached to a sheet steel plate placed over the opening to the fire box or combustion chamber. The burner body is held securely in place by two substantial brackets bolted to the burner boss. The burner tube projects through the hole in the burner boss and brick work so that the burner tip extends a few inches into the combustion chamber.

The oil enters at one side of the burner and the steam at the opposite side. The oil passes through an inner tube and the steam through the outer tube, or main casing, to the atomizing chamber in the burner. This chamber is so constructed that the steam atomizes and thoroughly mixes with the oil. The mixture which is produced is projected through the burner tip into the combustion chamber in the form of a very fine and almost gasified spray. This greatly aids in securing perfect combustion of the oil. The burner tip is so shaped that a flat, fan shaped flame on a horizontal plane with the boiler is produced. A fan shaped flame of this character affords maximum life for the boiler tubes or shell.

By-Pass: This burner is constructed with a steam by-pass fitted with a normally closed valve. Should the oil atomize in the oil tube due to the heat of the steam, or become otherwise clogged, the foreign matter may be blown out and the oil tube cleaned by simply closing the globe valve in the oil line and opening the by-pass and steam valves, thereby allowing the steam to blow out through the oil tube.

Application: It must be borne in mind that the proper location of the fire box, or combustion chamber, for use with an oil burner, the oil burning system behind the burner, and the

application of this equipment are just as important considerations as the design of the burner itself. Unless all of these points are taken into consideration and the scientific principles involved properly applied, it is impossible to guarantee the efficiency of any oil burner.

Standard Equipment: The standard equipment for each burner includes the burner body with needle valve, globe valves for the oil and steam supply lines, brass by-pass with valve, burner boss, and brackets for attaching the burner to the burner boss.

Data Required: In order to quote intelligently and specify the proper size of burner for your requirements, it is essential that we be furnished with answers to as many as possible of the following questions:

A. If you wish to install a new complete oil burning system for application to power boilers, answer the questions in Bulletin No. 2560.

B. If you wish to install oil burners only as an addition to an existing installation or change your present burners to those of our make, please answer the following questions:

1. How many boilers do you wish to fire?
2. Give name or make and type of each boiler.
3. State rated horsepower of each boiler.
4. State maximum percentage of boiler rating desired and number of hours of such operation.
5. State minimum percentage of boiler rating desired and number of hours of such operation.
6. What is minimum and maximum steam pressure required?
7. Give the dimensions of each fire box and describe its construction as clearly as possible. Send sketch if possible.
8. State in gallons per hour the amount of oil available for new burners.
9. Describe whatever oil burning system is now in use; gravity, air pressure, or pump feed; pressure on oil; temperature of oil; relative position of tanks, pumps and boilers. Describe steam and oil pipe layout and send sketch if possible.

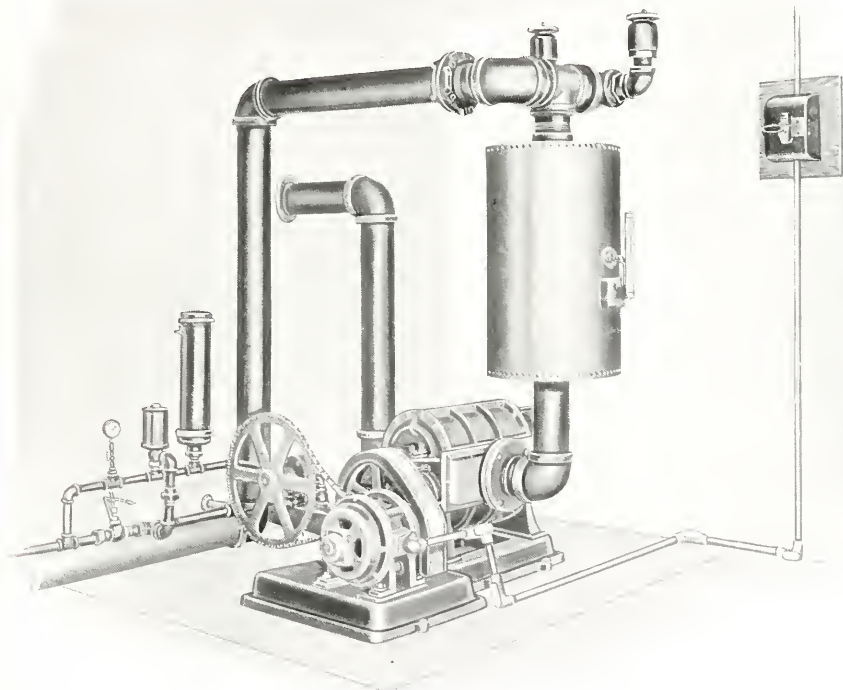
NOTE: This burner cannot be used in connection with low pressure heating boilers. For such boilers the low pressure type of burner and oil burning system should be used.

SEE BULLETIN NO. 2560 FOR INFORMATION ON COMPLETE
OIL BURNING SYSTEM FOR USE WITH POWER BOILERS

Wayne

Rotary Type Air Compressors

BULLETIN No. 3810



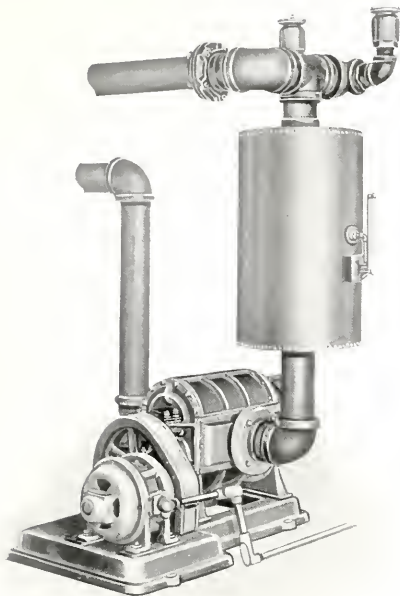
Typical installation of Cut No. 3845 Air Compressor showing chain drive of Cut No. 4015 Oil Pump from Compressor Shaft

Wayne Oil Tank & Pump Company

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Fort Wayne, Indiana, U. S. A.

Oil Storage Systems—Oil Filtration Systems Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating



Cut No. 3845 Air Compressor

GENERAL DESCRIPTION

The Cut No. 3845 and Cut No. 3855 Air Compressors are both of the same design and type, the Cut 3845 machine being a direct connected motor drive and the 3855 machine being belt driven.

Both of these outfits are of the rotary, or positive pressure, type. They are especially designed to furnish the necessary air in connection with the majority of oil or gas burning systems.

A UNIFORM AND STEADY flow of air, FREE FROM PULSATIONS, is delivered to the burners under a pressure of 1 to 2 pounds per square inch. This air pressure may be regulated by adjusting the weights on the air relief valves.

These machines are made in a large range of sizes with capacities varying from 200 to 6500 cubic feet of free air per minute. The capacity of the belt driven type may be varied by increasing or decreasing its speed, within certain limits, by changing the size of the driving pulley.

Standard Equipment: All of these machines are furnished standard with the following accessories, all of which are necessary for their proper operation:

Air Receiver. This receiver is designed with inner and outer tubes which eliminate all pulsations from the flow of air. It is not simply a hollow cylinder. It is constructed throughout of heavy open hearth sheet steel.

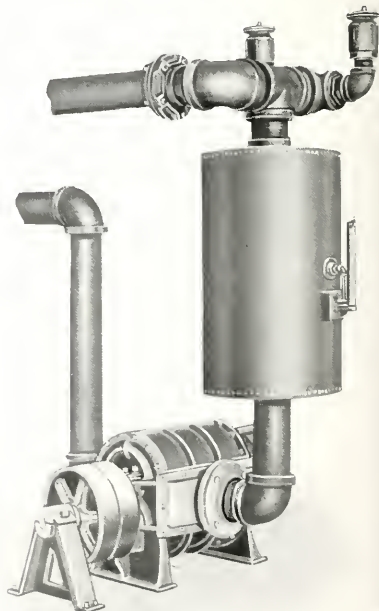
Air Relief Valves. Two of these valves of ample size to vent the full capacity of the compressor, are furnished with each machine. These valves are of the non-vibrating, weighted type.

Air Pressure Gauge. This gauge is of the mercury type. It shows the pressure of air in ounces and pounds. It is large and substantially constructed.

Sprocket Wheel. This sprocket wheel is for use in driving the oil pump. It is mounted on the driving shaft of the compressor.

Drive. The Cut 3845 machine is furnished with extended bed plate, electric motor of standard make and speed, and electric starter.

The Cut 3855 machine is furnished with driving pulley (or tight and loose pulleys if desired) and an outboard bearing.



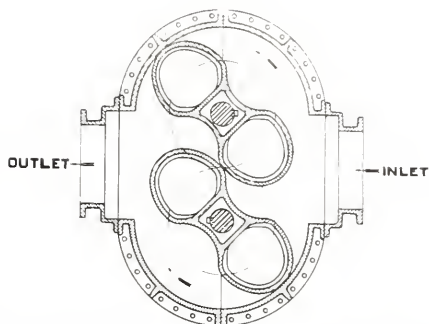
Cut No. 3855 Air Compressor

Operation: The drawing to the right illustrates the operation of this machine. Two impellers, mounted on parallel shafts in an enclosing case, rotate in opposite directions. The impellers fit the case except for an accurately maintained clearance of a few thousandths of an inch. Just sufficient clearance is allowed to prevent friction and at the same time maintain efficiency.

The driving pulley, or gear, is mounted on the lower shaft. The upper shaft is revolved in the opposite direction by means of a gear fitted to this shaft and which meshes with another gear fitted to the lower or driving shaft. These gears also serve to accurately maintain, or time, the position, or relation, of the impellers to each other.

When an impeller is in the position where one tip has just cut off the opening to the suction side, and the opposite tip is ready to leave the case so as to open to the discharge side, there is a volume of air trapped between the impeller and the case, which is not open to the suction or the discharge. As the impeller continues to rotate it opens to the discharge and pushes the enclosed volume of air positively into the discharge pipe. This action is repeated twice for each revolution of an impeller, or four times for each revolution of the compressor. The shape of the impellers is such that the greatest possible displacement, or greatest efficiency, is secured.

Construction: An essential point in the construction of this machine is the fact that the timing gears, connecting the impellers, are placed at the opposite end from the driving unit. In this way they are most accessible. When gears are placed



on the end next the drive, they cannot be removed for replacement without first removing the driving motor or pulley. It has also been found that the driving strains continually pound the set of gears if placed on the power end of the machine and cause them to wear very rapidly. With the gears on the opposite end from the driving unit the alignment of gears is practically unaffected from excessive belt pull or driving strains. The compressor also operates more smoothly and for a longer time without replacement.

Another important point in favor of this machine is that the driving gear or pulley is mounted on the lower shaft. This method of driving the compressor practically eliminates any vibration.

The impellers and case are accurately machined. The impellers are of close grained cast iron and are hydraulic pressed on forged steel shafts. The bearings are of single wedge, half box type, adjustable in a vertical direction, lined with a high grade of babbitt, and self oiled from a reservoir in the bottom of the box. The timing gears are made of a mixture of semi-steel which has been found to have excellent wearing qualities.

DATA REQUIRED

In order to quote intelligently, and specify the proper type and size of compressor for your requirements, it is essential that you supply us with answers to as many of the following questions as is possible:

1. If the Cut 3845 compressor is desired, state the electric current to be used. If alternating current, state voltage, phase, and cycle. If direct current, state voltage.

2. Kind of fuel you are now burning, or wish to burn. If oil state its specific gravity. If gas state whether natural gas, artificial city gas, or producer gas and give B. T. U. value if possible. If hard or soft coal, or coke, state which.

3. State maximum quantity of fuel consumed per hour. Gallons of oil, cubic feet of gas, or pounds of coal or coke.

4. If sufficient oil burners are now installed, state whether they are of the enclosed or open flame type. Give name or make if possible. Also state what air pressure you are now using for these burners.

5. If new burners or furnaces are to be installed and you do not know the probable consumption of fuel, state the kind of fuel to be used, number of fires, and describe as clearly as possible the operation at each fire. Also give the speed of production desired in each operation.

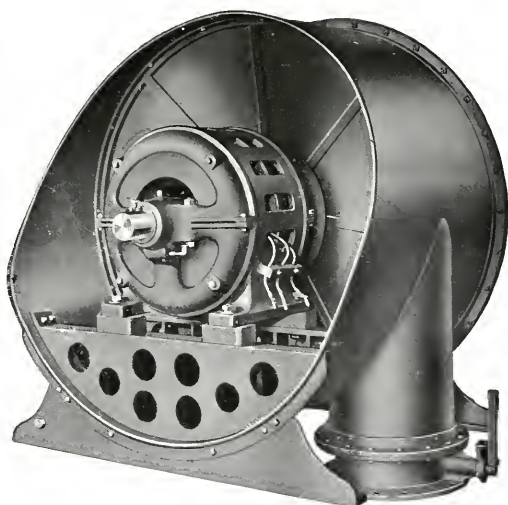
NOTE:—If the oil pump is to be driven from a separate power source, and not from the shaft of the compressor, a Cut 4055 Automatic Cut-Off Valve should be used in connection with the oil burning system. See Bulletin No. 4055.

SEE BULLETIN No. 2520 FOR INFORMATION ON COMPLETE OIL BURNING SYSTEMS

Wayne

Turbo Type Air Compressors

BULLETIN No. 3865



CUT No. 3865 AIR COMPRESSOR

Showing Motor End, Discharge Outlet, and Blast Gate

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

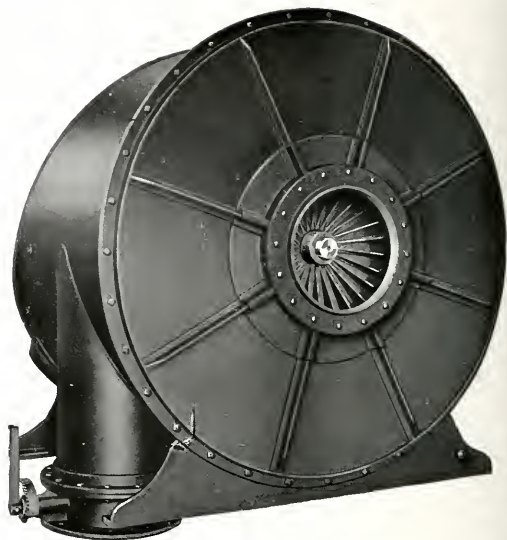
Fort Wayne, Indiana, U. S. A.

Oil Storage Systems—Oil Filtration Systems—Oil Burning Systems

Furnaces for Metal Melting, Forging and Heat Treating

The Cut No. 3365 Air Compressor is made in a large range of sizes with capacities varying from 600 to 10,000 cubic feet of free air per minute.

Standard machines are constructed to maintain a pressure of either 1, $1\frac{1}{2}$ or 2 pounds per square inch. However, the pressure cannot be changed on any one machine built to maintain any one of the above pressures.



Cut No. 3365 Air Compressor
Showing Motor End and Discharge Outlet

General Description

This Air Compressor is of the multi-stage turbo type. It is especially designed for supplying the necessary compressed air in connection with the majority of oil or gas burning installations. The air is delivered under a **CONSTANT AND UNIFORM PRESSURE, FREE FROM PULSATIONS**, to the burners.

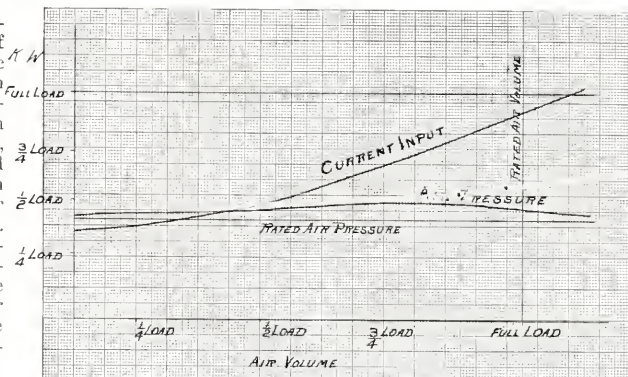
Operation: This compressor outfit consists of a turbine, or several sets of fanlike impellers, which revolve in a suitable enclosing case; an electric motor, upon the extended shaft of which the impellers are mounted; and the necessary inlet and outlet openings: all being mounted on a substantial frame in one integral unit. The inlet opening is in the housing at the center of the turbine and at the opposite side from the driving motor. The outlet opening is placed on the shell of the housing as shown in the cut. The action of the turbine draws the air through the inlet and discharges it under pressure through the outlet into the distributing pipe system.

Slow Speed: An essential point in favor of this machine, as compared with others of similar type, is its slow speed. This machine operates at a speed of 1750 R. P. M., which is generally considered by electrical engineers to be the most efficient and practical motor speed.

Noiseless: This machine is almost noiseless while being operated even under full load. This is unusual with either this type or the positive pressure type of compressor.

Pressure: A constant and steady pressure of air, free from pulsations or surging, is delivered. No relief or safety valves, or other means of regulating the pressure, are required. Although the volume of air being consumed may be reduced, the pressure will not run up, or if running under partial load and the full volume is suddenly required, the pressure will not fail.

Power Consumption: An important point in favor of this type of air compressor is the fact that the power consumed by the motor in driving the turbine is in proportion to the volume of air taken from the outlet. In other words, should the compressor be allowed to run with the outlet wide open the maximum amount of power would be required to operate it. On the other hand, should the outlet be entirely closed, the minimum amount of power would be consumed, only sufficient power would be required to revolve the turbine and churn the air entrapped.



The curve on this page illustrates the amount of electric power or K. W. that is consumed in proportion to the amount of air that is being delivered. For example, if this machine had a maximum capacity sufficient to supply twenty oil burners, when ten of these burners were shut down the amount of electric power required to drive the compressor would be automatically cut in half. In this way the cost of running this compressor is in almost direct proportion to the number of burners which it feeds.

Construction: The compressor and driving motor are direct connected, both being mounted on one substantial frame, thereby forming a compact, integral unit. There are no contacts or close clearances, avoiding any loss of efficiency or chance of wear.

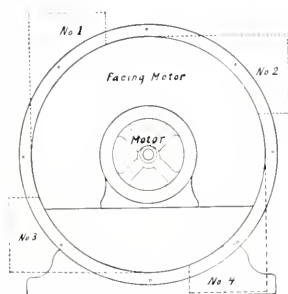
The compressor is constructed of plate steel, double wall, reinforced, giving a maximum of strength with a minimum of weight. Only two motor bearings and one ball thrust bearing are used. All motors are of the highest grade, standard types, and are of most approved makes.

Foundation: No special foundation for this machine is required. This is in marked contrast to the difficultly constructed bases required with many similar types of machines.

Electric Motors: Motors are furnished for use with 60 cycle alternating current or direct current of any standard voltage. 25 or 40 cycle motors can be furnished, but are not carried in stock.

Standard Accessories: Compressors equipped with 60 cycle, 2 or 3 phase alternating current squirrel cage motors are supplied standard with starting compensators with both no-voltage and overload protection. With the 5 H. P., 2 or 3 phase machine, no compensator is required, but an oil switch with overload and no-voltage protection is furnished.

A special blast gate and an air pressure gauge are furnished standard with each machine.



Outlet Positions: The drawing at the left illustrates the different positions in which the outlet can be furnished for convenience in connecting to existing pipe or a new pipe system. Outlets are furnished standard as shown in position No. 1. All of the above positions apply when facing the motor end of the compressor.

Data Required: In order to quote intelligently, and specify the proper type and size of compressor for your requirements, it is essential that you supply us with answers to as many of the following questions as is possible:

1. What electric current will be used. If alternating state voltage, phase and cycle. If direct state voltage.
2. State position of outlet desired, either No. 1, 2, 3, or 4.
3. Kind of fuel you are now burning, or wish to burn. If oil give its specific gravity. If gas state whether natural gas, artificial city gas, or producer gas. Give B. T. U. value if possible. If hard or soft coal, or coke, state which.
4. State maximum quantity of fuel consumed per hour. Gallons of oil, cubic feet of gas, or pounds of coal or coke.
5. If sufficient oil burners are now installed, state whether they are of the enclosed or open flame type. Give name or make if possible. Also state what air pressure you are now using for these burners.
6. If new burners or furnaces are to be installed and you do not know the probable consumption of fuel, state the kind of fuel to be used, number of fires, and describe as clearly as possible the operation at each fire. Also give the speed of production desired in each operation.

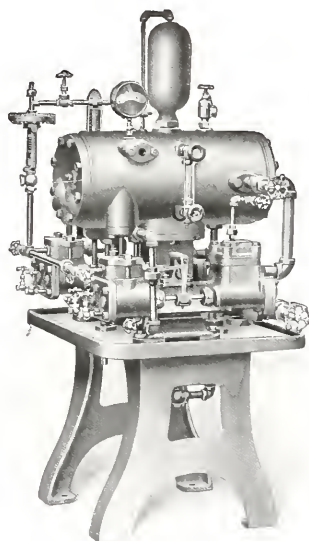
Note: A Cut 4055 Automatic Cut-Off Valve should always be used in connection with this type of air compressor. See Bulletin No. 4055.

SEE BULLETIN No. 2520 FOR INFORMATION ON COMPLETE OIL BURNING SYSTEMS

Wayne

Fuel Oil Pumping, Heating and Regulating System

BULLETIN No. 4040



Cut No. 4040

The cut No. 4040 Fuel Oil Pumping, Heating, and Regulating System is especially designed to draw the oil from the storage tanks and deliver it to the oil burners in a Clean and Properly Heated Condition and under a Constant and Automatically Regulated Pressure, Free From Pulsations.

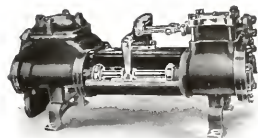
This type of system is the most efficient and satisfactory for use in connection with steam boiler installations; the electric motor or belt drive system being the most practical for use in connection with industrial furnaces, etc.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating



Cut No. 4050 Pump

Cut No. 4040. General Description

In order to burn oil successfully under boilers it is absolutely necessary that the oil burners be continuously supplied with clean, heated oil at a uniform pressure and in sufficient volume.

The cut No. 4040 Fuel Oil Pumping, Heating, and Regulating System is built particularly for this purpose, operating perfectly in connection with a properly designed and installed oil burning system.

This system is furnished complete and ready for connection to the necessary pipe lines. The system consists, in general, of two duplex steam pumps and a receiver, together with complete equipment of regulators, gauges, etc., all mounted on a substantial cast iron table constructed so that the top of the table acts as a drip pan.

It will be noted that the outfit is double. Only one pump is to be used for service pumping, the other being a reserve, for use in case of an accident to the working pump or when repairs may be required on this pump. This double arrangement insures a continuous and uniform supply of oil to the burners at all times and under all conditions, the importance of which can be readily appreciated. The pipe connections to the pumps of the apparatus are so arranged that either pump may be run in connection with the receiver by opening the steam, exhaust, suction and discharge valves controlling its operation while the corresponding valves for the other pump are closed.

A special governor automatically starts and stops the pump as the pressure in the receiver rises and falls, maintaining at all times the absolutely uniform pressure so necessary for the successful operation of an oil burning installation.

The oil is heated in the receiver by means of a coil of pipe supplied from the exhaust steam from the pump.

Operation and Construction.—The pump draws the oil from a storage tank and delivers into the oil receiver, from which it is distributed to the burners through suitable pipe lines, the machine serving one or any number of burners within its capacity and at an equally uniform pressure. The storage tank should be located so that the top level of the oil is below the level of the furnace burners in order to prevent the oil from flowing to the burners by gravity when the pump is not running, but should not be so far below the pumps as to make the suction lift excessive. A good arrangement is to bury the tank outside the building and near a railroad siding for convenience in filling direct from tank car.

The receiver should be about two-thirds filled with water, an inlet pipe for this purpose being provided which is connected with any convenient source of water supply. A valve should be located in this inlet pipe near the receiver and this is to be closed at all times, except when filling the receiver. A gauge glass on the receiver body shows the height of water inside. The oil which is pumped into the receiver passes up through the water and rests on its surface. An air chamber acts to maintain an even flow of oil from the receiver and a relief valve located on the receiver top prevents the oil pressure from increasing above the normal. On account of the air and oil vapor, which might get into the suction pipe and pump and so increase the tendency of the pump to become air or vapor-bound, this relief valve should not be piped back into the suction supply connections of the pump, but preferably to the top of the supply tank.

It is very important to maintain a strictly uniform oil pressure in order to insure a satisfactory operation of the burners. A pressure gauge on the receiver indicates the oil pressure at all times, and a thermometer, also located on the receiver, shows the oil temperature. An air cock on the receiver top is for the purpose of letting out air before filling and starting up. It is recommended that this be piped over the supply tank so that, in case of an over amount of vapor in the oil, the valve can be left slightly open and the vapor and oil allowed to drip into the tank.

A small pipe leading from the top of each pump cap to the receiver is for preventing the accumulation of oil vapor above the discharge valves and the valve in the pipe should be wide open at all times except when the pump is to be cut out of the system.

An automatic steam regulating valve on the steam pipe near the pump, which is connected with the

pressure chamber of the oil reservoir and operated by the oil pressure inside, controls the speed of the pump and insures uniform pressure and supply of oil at all times. The valve in the pipe connection between pressure chamber and regulator should be wide open at all times when pump is running. While the receiver is good for a working pressure of 150 pounds per square inch, the pressure usually carried is about 30 pounds and unless otherwise ordered, the regulating valve for each outfit sent out is set for this pressure. When so set it can be adjusted for pressure ranging from 20 to 55 pounds. Regulator and relief valve, however, will be furnished for any pressure desired without extra charge.

Inside the receiver is a series of pipe coils for heating the oil when this may be required. These coils are so connected that the exhaust steam from either pump may be passed through them for this purpose, or, if the oil is not to be heated, may be exhausted direct to the atmosphere, two valves controlling the complete change. In cases which may occur where an unusual amount of heat is temporarily required it will be found that this can be successfully accomplished by running the pump at a higher speed and by-passing the surplus oil through the relief valve to the suction supply. The extra exhaust steam will supply the required heat and the oil which is repumped is also refiltered and in its best condition for burning. The oil outlet from the receiver is so located that the discharge takes place from the surface of the oil layer instead of the bottom.

The oil strainers, which are located in a chamber at the inlet end of the receiver, should be examined occasionally and kept free from sediment. The sediment at the bottom of this chamber also should be frequently blown out through the drain pipe which is provided for the purpose. With some kinds of heavy oil, which may carry an unusual amount of dirt and grit in suspension it is advisable to use an additional strainer in the suction piping near the pump and this strainer should be frequently inspected.

The water in the receiver serves two purposes:

1st. Minute particles of the receiver water vapor attach themselves to the oil as it passes through the water and are carried along to the burners with it. This mixture acts to minimize carbonization at the burner outlet, which may possibly occur when air under pressure is the atomizing agent.

2nd. When the water is heated by the coils which extend into the receiver it acts on the globules of oil as they pass through it, heating them rapidly and uniformly to the proper atomizing temperature.

While the addition of water, as above outlined, is highly recommended, the apparatus nevertheless will deliver many kinds of oil to the burners in an entirely satisfactory condition without the use of any water at all, the receiver in this case being filled entirely with oil, but discharging from the top surface same as with the water arrangement.

Most oils used for fuel are atomized with a less expenditure of energy, and produce the best results when heated to a temperature just below their distilling point, or from 150 degrees to 200 degrees, depending on the grade of the oil. Some light oils do not require heating.

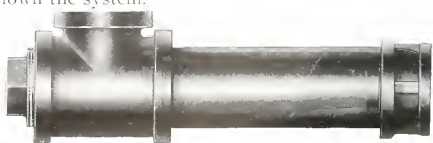
The apparatus altogether is simple and easily controlled. It is also perfectly safe, no exposure of oil occurring anywhere in the system between storage tank and burners, and it is in no way affected by gravity, the oil supply being below the level of the burners. It handles heavy or light oils equally well and its operation is entirely automatic after starting up.

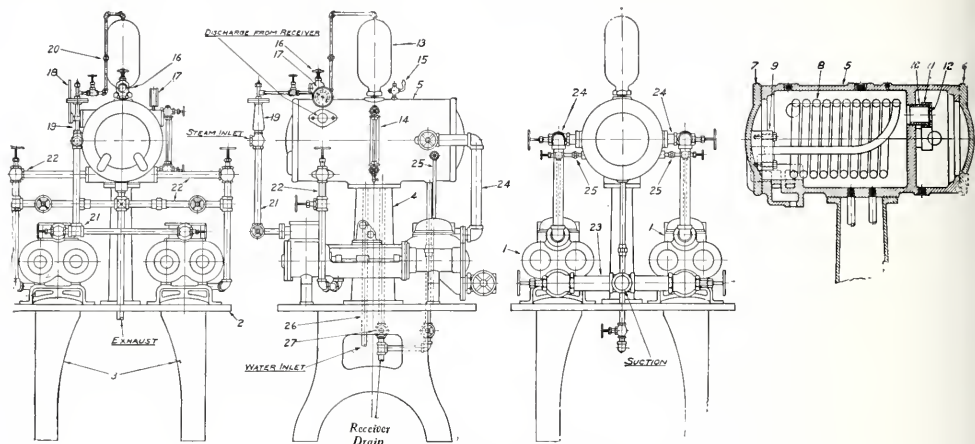
Separate Pumps.—The Cut No. 4050 Pump is of the duplex piston type and is the type of pump used with the Cut No. 4040 system. This pump is constructed especially for handling fuel oil.

When the complete system is not desired, one or more of these pumps can be supplied separately in a large range of sizes.

Pipe Line Strainers.—The Cut No. 118 Pipe Line Strainer should always be installed in the suction line from the tanks. It is advisable to install this strainer in duplicate with shut off valves for each strainer so that either strainer may be cleaned without shutting down the system.

This strainer is constructed in a number of standard sizes for connection with 1", 1½", 1¾", 2", 3" or 4" pipe.





Line Drawing of Cut No. 4040.
Fuel Oil Pumping, Heating, and Regulating System.

GUIDE TO PARTS:

- | | | | |
|------------------------------|----------------------------|---------------------------------------|-----------------------------------|
| 1. Pumps. | 8. Heating Coil. | 15. Air Cock. | 21. Steam Piping and Valves. |
| 2. Base Plate. | 9. Heating Coil Flanges. | 16. Relief Valve. | 22. Exhaust Piping and Valves. |
| 3. Legs. | 10. Oil Strainer Body. | 17. Pressure Gauge. | 23. Suction Piping and Valves. |
| 4. Receiver Support | 11. Oil Strainer Cap. | 18. Thermometer. | 24. Discharge Piping and Valves. |
| 5. Receiver. | 12. Oil Strainer. | 19. Fuel Oil Governor. | 25. Air Relief Piping and Valves. |
| 6. Receiver Head (Oil End). | 13. Air Chamber. | 20. Fuel Oil Governor | 26. Water Inlet Pipe. |
| 7. Receiver Head (Coil End). | 14. Gauge Glass, complete. | 27. Receiver Drain Piping and Valves. | |

Standard Sizes and Specifications of Cut No. 4040 Outfits

Size No.	Size of Duplex Pumps, Inches	Capacity per Minute		H. P. Boiler (at 35 lbs.) System will supply* (conservative estimate)	Diameter Pipes, Inches				Approx. Space Occupied, Inches			Approximate Shipping Weights
		No. Single Strokes Each Piston	Feet Piston Speed	Gallons Both Cyls.	Steam	Exhaust	Suction	Discharge	Length	Width	Height	
3	3 x2 x3	50 to 120	12.5 to 30	4 to 10	$\frac{3}{8}$	$\frac{1}{2}$	$1\frac{1}{4}$	1	33	35	65	1275
4	$4\frac{1}{2}$ x2 $\frac{3}{4}$ x4	40 to 105	13.3 to 35	8 to 21	$\frac{1}{2}$	$\frac{1}{2}$	2	$1\frac{1}{2}$	40	35	75	2000
5	$5\frac{1}{4}$ x3 $\frac{1}{2}$ x5	38 to 98	16 to 40	16 to 39	$\frac{3}{4}$	1	$2\frac{1}{2}$	2	50	45	85	3000
6	6 x4 x6	36 to 90	18 to 45	23 to 58	1	$1\frac{1}{4}$	3	$2\frac{1}{2}$	60	52	85	3650
7	$7\frac{1}{2}$ x5 x6	36 to 90	18 to 45	36 to 91	$1\frac{1}{2}$	2	4	3	64	58	90	4200

Pressure.—The maximum pressure of this machine is—pumps and receivers—150 pounds per square inch.

Oil Pressure.—The pressure regulator is set for 30 pounds oil pressure, unless otherwise ordered, and when so set can be adjusted for pressures ranging from 20 to 55 pounds. The regulator will be set for any other pressure desired without extra charge.

Heavy Oils.—For very heavy oils it is advisable to use the next size larger outfit than for the displacement required.

Design.—The design of the sizes 6 and 7 are not the same as that shown in Cut No. 4040.

Standard Equipment. The standard equipment includes two duplex pumps and receiver, on base plate, water gauge glass, oil pressure gauge, thermometer, pressure regulator, relief valve, and all necessary piping and fittings as listed above.

SEE BULLETIN NO. 2550 FOR INFORMATION ON COMPLETE OIL BURNING SYSTEMS



Automatic Cut-off Valves Cuts No. 4055 and No. 4060

BULLETIN No. 4055

Fuel Oil can be burned with a high degree of safety when the Oil Burning System consists of the proper equipment correctly installed. However, lack of such equipment and carelessness in this respect have caused serious fires. Most of these catastrophies have been due to two causes—discharging unatomized oil into a hot furnace—and to fuel oil supply pipes bursting or being broken in some way, flooding the furnace or boiler room.

The Cut No. 4055 Valve will safeguard the first contingency and the Cut No. 4060 Valve will prevent the second danger.

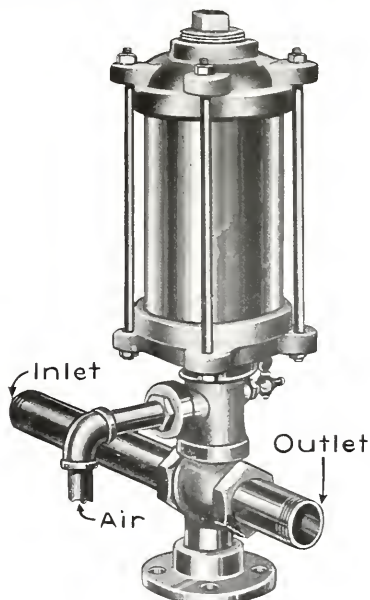
Cut 4055—General Description: This Automatic Cut-off Valve is designed for use with oil burning systems of the low pressure air type, for connecting together, or co-ordinating, the flow of oil and air. It will instantly and automatically stop the flow of oil when the air pressure fails.

In such oil burning systems the compressed air for combustion is also used for atomizing the oil at the burner. When the air pressure is suddenly cut off, due to burned out fuses, motors, carelessness, etc., and the oil continues to discharge into hot furnaces in an unatomized state—the flame suddenly blazes up to the ceiling or roof of the building and it is often impossible to get near such furnaces to shut off the burner.

This, of course, cannot happen when the oil pump is driven from the shaft of a rotary type blower as the two start and stop simultaneously. However, when turbo, centrifugal or fan type blowers are used and make it necessary to drive the oil pump with a separate small motor or power source, a Cut No. 4055 Automatic Cut-off Valve should always be used.

Operation: The Cut No. 4055 Automatic Cut-off Valve should be installed in the oil discharge pipe near the pump. A branch air pipe of small diameter is run from the compressor or blower to the proper connection on this valve. The air pressure forces up a weighted piston in the cylinder, thereby opening a valve in the base of the device and allowing the oil to flow freely to the oil burners as long as the air pressure is maintained. Whenever the air pressure is shut off or otherwise fails the weighted plunger automatically drops, closing the valve and instantly stopping the flow of oil. The relief valve on the pump takes care of the pump discharge.

This valve is of substantial construction. It is made in one size only with 1 1/4" oil pipe connections. It may be operated with air pressures varying from ten ounces to two pounds. The air pressure for which it is to be used must be definitely stated when ordering.



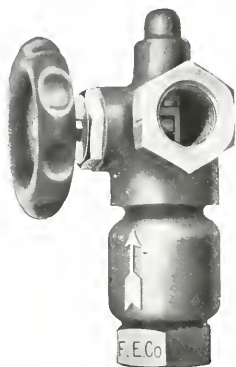
Cut No. 4055.
Automatic Cut-off Valve.

Wayne Oil Tank & Pump Company

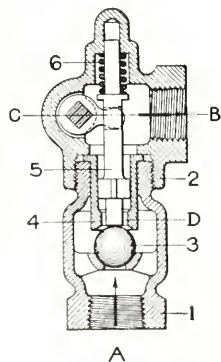
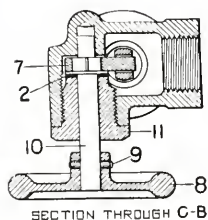
Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Boring Systems
Furnaces for Metal Melting, Forging and Heat Treating



Cut No. 4060.
Automatic Cut-off Valve.



Cut No. 4060—General Description: This Automatic Cut-off Valve varies in its use from the Cut No. 4055 type in that it is in no way connected with the air supply. It is simply constructed for installation in the oil supply pipe in connection with any type of oil burning system. It is good practice to install one large master valve near the pump and separate small valve near each fire. In this way, should a pipe line burst or become broken at any point, this valve will automatically close, instantly stopping the flow with less than a half pint loss of oil. The valve then remains closed and before again thrown into commission, must be opened manually by the hand wheel.

This valve is of substantial construction, is of ample proportion to insure freedom from resistance to flow of oil, is positive in action and reliable.

Operation: Install the automatic stop valve on the line so that the flow through the device is in the direction indicated by the arrow cast on the body.

Normally the valve is open, the ball (3) being held in that position by means of spring (6). This permits the fluid to pass through the valve. In the event of a rupture occurring in the line, the flow of fluid exceeding the maximum carrying capacity of the main port (D) causes an abrupt reduction of pressure on the outlet side of valve at (B) and permits the pressure on the inlet side of valve at (A) to lift and force ball (3) to its seat, preventing the flow of fluid from inlet (A) to outlet (B).

When normal conditions are again restored, to open valve turn hand-wheel (8) to the right. This forces ball (3) from its seat and allows the pressure to equalize on both sides of the valve. The device is then ready to respond to further contingencies.

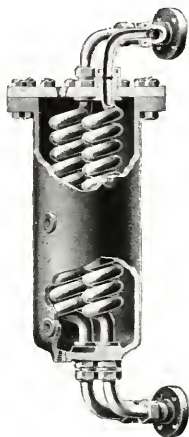
Caution: See that all stop valves on supply line are wide open.

Made in sizes from $\frac{1}{2}$ " and up. Screwed or ferrule connections.



Fuel Oil Heaters

BULLETIN No. 4070



Cut No. 4070.
Fuel Oil Heater.

The Cut No. 4070 Fuel Oil Heater is designed for use where the oil or tar to be burned runs below 20 degrees Beaume gravity and must be heated in order to reduce its viscosity. This insures proper atomization at the burner and materially reduces the difficulty of delivering the oil to the burners in a constant and steady flow and with a minimum loss of pressure due to friction in the pipe lines.

When exceptionally heavy oil or tar is burned, a separate heater of this type, fed with live steam, must be used in addition to the heater furnished with the standard pumping, heating and regulating system, the latter heater being fed with exhaust steam from the pumps.

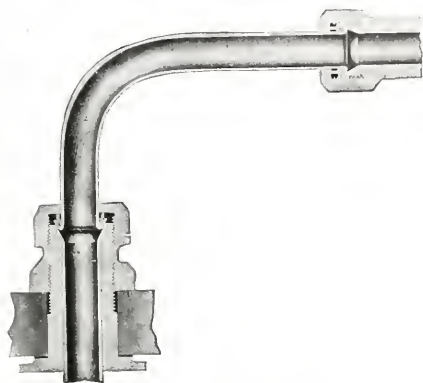
Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

Cut 4070---General Description



Patented Oil Heater Joint

The Wayne Fuel Oil Heater is made in 6 standard sizes, is substantially constructed, is of ample proportions and designed to afford the maximum heating surface to the oil and to reduce to the minimum the resistance to the flow.

The semi-section cut of the heater on the front of the bulletin shows the steel coils through which the oil flows and the surrounding steam jacket. It will be noted that the coils are each in one piece so that there are no connections or joints inside of the heater, thereby preventing leakage of oil into the steam compartment. Such oil would eventually reach the boilers by way of hot well or filter box.

It will also be noted that this heater is constructed with manifolds at the inlet and outlet oil connections and that the flow of oil is split up so as to flow through two or more separate coils. In this way a greater surface of oil is exposed to the heat, the velocity of flow through the heater is reduced, and the resistance to the flow, or loss of pressure due to the bends in the coil, is reduced to a much greater extent than would be possible with simply one coil.

The shell is constructed of close grained cast iron, the heads of steel, and the manifolds of composition. The coils are of 1" outside diameter, No. 16 B. W. G. seamless drawn steel tubing. The coils are attached to the manifolds outside of the heater by means of the special patented connections shown in the illustration above.

Standard Equipment consists of heater complete with Steam Pressure Gauge with Syphon, Water Gauge Glass, and Thermometer for oil temperature.

STANDARD SIZES AND SPECIFICATIONS CUT NO. 4070 FUEL OIL HEATERS

Size No.	I. D. Shell Inches	Height Ft.-Ins.	Approx. Wght Lbs.	Size of Connections---(Inches)		
				Oil Inlet and Outlet	Steam Inlet	Steam Drain
1	7	4' 10 ³ / ₈ "	360	1	1	³ / ₄
2	12	4' 11 ¹ / ₄ "	785	1 ¹ / ₂	1 ¹ / ₄	1
3	13 ¹ / ₄	5' 0 ³ / ₈ "	960	2	1 ¹ / ₂	1
4	14 ¹ / ₈	5' 0 ³ / ₈ "	1445	2	1 ¹ / ₂	1 ¹ / ₄
6	18	5' 1 ³ / ₈ "	2055	2 ¹ / ₂	2	1 ¹ / ₄

HYDROSTATIC TEST PRESSURES

(Not Working Pressures)

Shell and head, 375 lbs. per square inch. Coils and manifolds, 600 lbs. per square inch.



Engine Room Economies And Oil Filtration Systems

BULLETIN No. 5000

This bulletin pertains to the subject of Oil Filtration. It relates especially to operation of Central Oil Circulating Systems for all kinds of machinery and prime movers. It treats generally of the different modern lubricating methods made possible by the use of an efficient oil filter. Available data on this subject is very scarce, and what little there is has never been made of definite value. The subject of clarification of oil is the problem of operating engineers. It has been only very recently that the problem has been solved by test and experiment, and definite results have been established. Methods of attaining purified oil and perfect lubrication are explained herein.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

**Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating**

Advantages of a Central Oil Circulation and Filtration System

1. Oil expense may be decreased as much as 90%.
2. Stream feeding of oil is made possible without prohibitive expense.
3. A stream of cool, clean oil floods the bearings at all times.
4. Mechanical efficiency of plant will be increased on account of:
 - (a) Reduction of frictional losses.
 - (b) Saving in renewals of bearings effected because of practical elimination of wear thru flood lubrication.
 - (c) Labor is saved. The services of the oilers may now be dispensed with.
 - (d) Expensive shut-downs, due to faulty lubrication, are eliminated; time lost in production, occasioned by bearing repairs on engine, is reduced to a minimum.
 - (e) Saving in depreciation, caused by the lack of the usual wear and tear on engines.
5. With flood lubrication, shock and vibration practically do not exist.
 - (a) Bearings do not heat and never have to be loosened.
 - (b) Worn particles of bearings are washed out by the stream of the lubricant.
6. The risk that was taken by the oiler in climbing around the moving machinery while performing his duty is done away with.
7. Clean oil is always fed exactly where it is needed.
8. No oil is wasted by excessive evaporation or by sloppy methods of hand oiling; the oil is collected from the bearings, filtered and used over and over again.
9. The operation of a system is entirely automatic. Watchful attention of an oiler is not needed to keep the bearings always supplied with oil.

Economies From Correct Lubrication

Modern Competition requires a reduction in the cost of producing power. From the smallest industrial plants, as well as from the large public service central power stations, economical production of power is demanded. The elimination of all conditions that produce waste in fuel, and the reduction of all the factors entering into the cost of power is the goal toward which every Power Plant Superintendent is striving.

The lessening of frictional resistance is one of the most important factors entering into the economical production of power. It is highly essential to the gain of that last 6 or 8 per cent in the efficiency of an engine or machine. Frictional losses have always been a cause for expensive power. Means for reducing frictional resistance in engines and machinery have been the study of engineers for a long time. The elimination of transmission shafting, and the increased size of power units together with the use of flood lubrication testify to this effort.

Lubrication Methods

It is through the use of increased lubrication that the greatest saving in frictional loss is now being made. Frictional loss can be reduced to a minimum only by the most liberal use of oil. The oil bath or flood lubrication represents the most perfect lubrication possible as well as the limit beyond which friction cannot be reduced by lubrication. The coefficient of friction with surfaces lubricated by the oil bath is only $1/16$ to $1/10$ that for scantily lubricated surfaces. Stream feeding is the best example of flood lubrication, while scanty lubrication is represented by all hand or drop feeding of oil.

With hand oiling there is a large waste of oil, because of the difficulty in regulating the flow to just the proper amount required by each bearing. After passing through a hand-oiled bearing, the oil is partially recovered only by means of drip pans, and there is consequently a considerable loss, even under the best operating conditions. Grit and dirt often cause considerable trouble when hand oiling is used, and the close attention necessary to maintain any sort of efficiency from a lubricating standpoint, makes hand oiling dependent entirely upon the personal efficiency of the operator.

Stream feeding of oil to engine bearings, until a very short time ago, was entirely out of the question, for after the oil was once used, it was thrown away as worthless. It was only after the idea of collecting the waste oil and cleansing it, was thought of, that the stream feed lubrication was made possible. The expense of furnishing new oil in the stream to the bearings was out of proportion to the gain in power and to the depreciation due to the wear and tear on the engine. Every user of lubricating oil appreciates the fact that the cost of oil in all power plants is a large item of expense, and, due to the gradual increase in the cost, this item of expense is always assuming larger proportions.

In this booklet, we will set forth a few of the

many advantages derived from stream feeding, and particularly enumerate some real economies in lubrication expenses effected by the Wayne method of stream feeding oil in a properly designed central oiling and filtration system.

Reduction of Friction Due to Flood Lubrication Means a Saving of Fuel

The cost of lubrication is directly connected with the cost of power in the operation of factories, mills and power plants. In the average plant, large savings may be effected in the cost of power by expending thought and care in the selection of a proper method for handling lubrication to prime movers and individual machines.

The reduction of frictional loads by the elimination of transmission shafting, has for sometime been the aim in factories and mills. Great possibilities yet remain for the reduction of frictional losses, and consequently the reduction of cost per horse power. Frictional losses in the prime mover may be as high as 20% of the power supplied to it. By the use of a first class lubricant on the older type of engines, this loss may be reduced 6 to 8%, and in the modern high speed engines, 3 to 4%. By the Wayne Method of flood lubrication, a great reduction in the loss of power and consequent saving of fuel may be effected that will amount to an additional 1 to 4%, depending upon the type of engine.

Of course, some engineers think this kind of economy is too small to be considered, but take for example the average Corliss Engine developing about 300 h. p., with the cost of steam per h. p. hour, taken at 1.3 cents. If this engine runs 300 days per year, at 24 hours per day, the actual cost per year for steam power will be \$28,080.00. Now a system delivering flood lubrication will effect a saving of frictional losses amounting at the minimum of 1 %, which for the year will be \$280. Since a lubrication system to effect this saving can be installed for around \$1,000 the saving in power alone would return 25% of the principal invested.

This is a fair example to illustrate saving in a small plant that will obtain a most liberal return on a moderate investment. The proportion remains the same for large plants. An engineer at once perceives the saving of coal, effected by a modern lubrication system.

Stream Feeding Saves Oil

So great is the waste of lubricating oil that very little new oil would be required if it were not for this extravagant waste. The source of 95% of oil loss is due to hand feeding. Every drop of oil that gets on the floor of the engine room or the foundation of the machine is lost, and every drop of superfluous oil that is wiped with waste from the machine itself is not recovered. It is true that drip pans can catch much of the oil as it drips from the bearings, but consider the spillage that always takes place when the drip pan is emptied. It has been proven that oil does not wear to any appreci-

able extent in volume. With scant lubrication, the surface of a journal is not completely protected by a film of oil, because the oil is unevenly distributed. These points of contact cause the normal heat of the bearing to be much higher than it would be if the lubrication was perfect. Consequently, this unnecessary rise in temperature, while not sufficiently dangerous to excite any notice, is enough to cause unnecessary evaporation losses, which continues as long as hand feeding is used on that bearing. This loss by evaporation is entirely eliminated by the use of flood lubrication, for the bearing temperature will seldom be over blood heat; and in an amply supplied stream fed bearing, the heat developed is a negligible quantity.

Saving of Bearing Renewals by Flood Lubrication

The annual expense of maintaining journals is no small item, especially in steel and rolling mills. Every journal built for heavy duty is sure to need renewing sooner or later. In a large mill the saving effected in prolonging the life of journals by the use of a properly designed oiling system, in one year's time, alone, will nearly amount to the cost of the system. It is not only the saving in power that is gained but the increased life of all of the wearing parts. This item of reduction in wear is often never considered as one of the advantages of an oiling system, nevertheless, 5 to 10% of the total saving effected by the system can be credited to the reduction of wear, and the saving of renewals.

Stream Feeding of Oil Saves Shut-Downs

Shut-downs of any plant are very expensive. The time lost in production, and the delay occasioned by some necessary repairs are very annoying, especially when they occur in such a vital point as the engine room, and put the whole plant out of commission. Shut-downs do not happen every day, and there are plants which run for years without interruption in the service. To keep a plant in continuous operation, every precaution must be made to guard against trouble. The old adage, "an ounce of prevention is worth a pound of cure," holds just as true in the engine room as elsewhere. It is demanded of the operating engineer that he keep his plant in continuous service, as well as low in cost of operation. He must account for every delay and every item of expense. Therefore, any system that can be installed to prevent delay, guard against mishap, and insure his plant against bearing trouble, should be secured and considered as necessary, as protection from any other hazard. A properly installed Central Oiling and Filtering System supplying a flood of oil to the bearings is the exact protection against those expensive shut-downs caused from insufficient and improper lubrication.

Saving of Labor

Consider the labor saving advantages made possible by the use of an oiling system that will deliver just the right kind of pure, cool oil to all the points

of lubrication on an engine or group of engines. Such a system is reliable and is always on duty. The work of an oiler may be dispensed with altogether, and such wiping up as is necessary once in a while can be done by common labor. The engineer can devote his entire time to other duties than those arising from empty oil cups and hot bearings. The adjustment of bearings becomes so infrequent that it can be discarded as a duty for the engineer. The labor saving item alone in the average plant developing 5,000 K. W. would be the saving of one oiler or \$1,200.00 per year, which would be a saving alone of about 60% of the cost of an oiling system.

Saving in Depreciation

The advantages of an oiling system are so very numerous that lack of space requires us to only mention a few of them. However, it must not be forgotten that the saving in depreciation of machinery and foundations is an item of immense proportion. Depreciation amounts annually to about 5% on slow speed engines. The ordinary life of engines is considered to be from 18 to 25 years. The wear and tear can be reduced by stream feeding of oil, and the life of a machine can be lengthened 40 to 50%. This is another saving credited to efficient lubrication.

Eliminates Loss by Evaporation

Because there is no loss by wastage and excessive evaporation, a higher grade oil may now be used and every advantage obtained by the use of the highest grade of oil may now be secured. This cost is nothing compared to the gains derived from its use in a central oiling and filtration system.

In one Wayne System, continuously circulating 350 gallons per hour, it has been found necessary to add only 2 bbls. of oil per month. This is only an average example of what can be done in an oiling system. The 350 gallons per hour equals 5,180 bbls. per month, and the actual shrinkage is only 2 bbls. When it is considered that the actual oil used was only four hundredths of 1% of the total amount circulated, it is easy to consider the loss by evaporation and usage, as being almost negligible.

So universally accepted are the advantages of stream or flood lubrication that automatic oiling and filtering systems are considered real necessities in every engine room or power plant which makes a pretense of operating on an efficient basis. In order that the advantages of flood lubrication will more than off-set the increased cost of oil consumption, the oiling system must contain an oil filter that will restore the oil to its original pure state for re-use. While it has been demonstrated by numerous tests that a good grade of oil may be continuously circulated for months in an oiling system without much shrinkage in volume and with no appreciable deterioration of its lubricating qualities, the most important part of an oiling system depends altogether upon the rapid, efficient and dependable action of the filter.

Purified Oil From a Wayne Filtration System As Good As New Oil

There are many engineers, especially those from the "Old School," who are impressed with the belief that after an oil has once been used, it should be thrown away as worthless. Too much has depended upon the use of pure, clean oil in their engine room for them to take a chance of bothering with what they think is worn-out, half consumed oil, possessing little lubricating value.

In order to overcome this very popular idea and to prove that lubricating oil does not wear out, we recently had tested in the laboratories of Cornell University, an oil that had been used in a "Wayne" Oil Filtration System, installed in a municipal power plant developing 5,000 K. W. under conditions that are typical of most every plant developing electric power. This plant was

to note that only two (2) barrels of new oil were required each month to replace that lost by evaporation, leakage and spillage.

The oil came from the turbines at a temperature of 150° Fahr. and naturally was affected by some evaporation. However, there was no other shrinkage because the system was entirely closed.

In order to determine conclusively the condition of the oil after being in use for eight months, a sample of the clean filtered used oil, together with a sample of the new unused oil, were submitted to the Cornell Laboratories for a complete physical analysis. Friction tests were made on the Thurston Railway Oil Testing machine with smooth brass bearing on a steel shaft, run at a constant speed of 298 R. P. M. The loads were applied in increments of 20

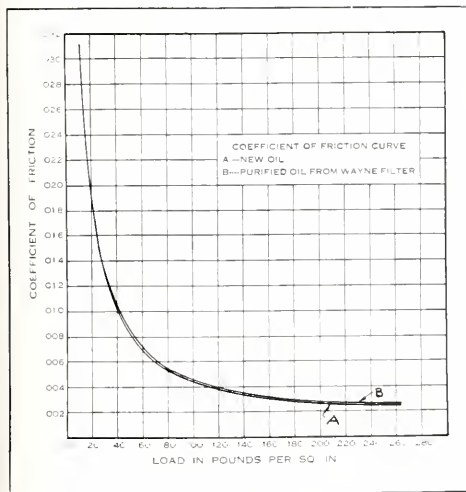


Fig. 1

required to be in continuous operation. The generating units were Vertical Curtis Turbines receiving flood lubrication on all guide bearings as well as the main step bearings. The small auxiliary units received their oil from the same system. This oiling system held approximately 10 bbls. of oil and the average amount circulated was 350 gallons per hour or about 5,000 bbls. per month. This means that, during each month, every drop of oil in the system passed thru a bearing at least 500 times. With this enormous quantity of oil being continuously circulated thru the system, it is of great interest

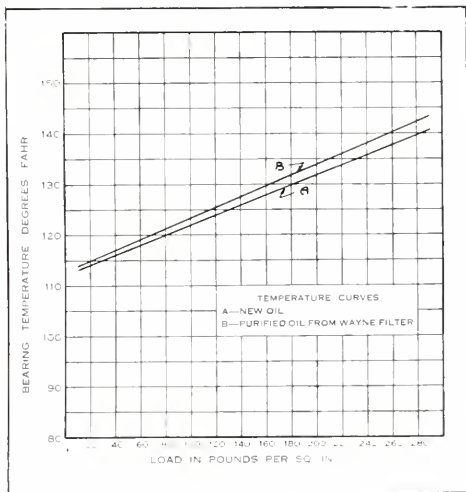


Fig. 2

pounds from 0 to 260 pounds per sq. in. The results of this test are shown in figures 1 and 2. It will be noted that the co-efficient of friction curves almost coincide, the difference is so slight. In Fig. 2, bearing temperature has been co-ordinated with load per sq. in. The increased temperature resulting from the use of filtered oil which has been in use eight months and passed thru a bearing more than 4,000 times is so slightly greater than new unused oil that the difference is negligible. This alone is proof that the lubricating properties of the old oil have been uninjured thru use.

Another important test given the oil was a viscosity test at various temperatures made on the Saybolt Standard Viscosimeter. These results are plotted in Figure 3 and show that the used oil possesses a slightly heavier body. The viscosity of an oil or its cohesive property is increased by constant use as is shown by this data. While the amount of change is so very small, it goes to prove that the heat of the bearings evaporates the lighter volatile elements to be found in the oil and leaves the body of the oil slightly heavier. Used filtered oil does not become thin.

The results of other tests to determine physical changes are as follows:

New Unused Turbine Oil

Color, pale transparent yellow.
Specific gravity, .877.
Chill point, 29° F.
Flash, 383° F.
Fire, 445° F.

Same Turbine Oil After Eight Months' Use and Purified by Wayne Filter

Color, light transparent brown.
Specific gravity, .880.
Chill point, 29° F.
Flash, 387° F.
Fire, 452° F.

This data is sufficient proof that a filtered oil is as good as new oil and also proves the remarkable efficiency of the Wayne filter.

It is wonderful to realize the economy in oil consumption that may be obtained thru the use of the System that will deliver purified oil in such large quantities and at such a small cost. The actual oil

purchased in this plant was less than four hundredths of 1% of the total amount used.

The economy effected has not been only in the purchase price of oil saved. It has been in all of the many benefits derived from flood lubrication—a saving of labor, a saving in power, the saving in wear and tear of machines and the saving derived from continuous uninterrupted service, all of which go to make up the economical importance of the continuous oil filtration system in the operation of the power plant.

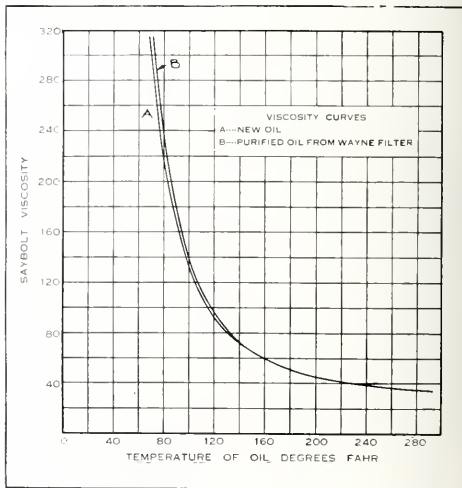


Fig. 3

Oil Clarification

The clarifying of an oil or the removal of all impurities foreign to the oil is accomplished by two general processes, namely, precipitation and filtration.

Precipitation. Precipitation can be the result of the action of some chemical re-agent or the natural settling by gravity of any impurity heavier than the oil. If the oil be permitted to stand at rest in a vessel during a long period of time, and be free from the slightest movement, all impurities held in suspension, will seek a stratum in the oil depending upon their relative weights. Impurities heavier than oil will rest on the bottom of the vessel, while lighter impurities will seek the surface and remain on the top of the oil. The best known example of this precipitation or separation by gravity is found in the paint bucket. The heavy coloring pigments will settle to the bottom of the bucket after separating from the vehicle, while the lighter thinning liquids rise to the top of the bucket. The thoroughness of this separation depends altogether upon the length of time the paint is allowed to stand at rest.

Filtration. Filtration is another name for screening oil through a fine mesh or porous substance capable of permitting the clean oil to pass through and holding back those impurities unable to pass through the small openings. Filtration of a liquid may be compared to the screening of a dry substance. Uniform, dry, granular substances are separated from the large undesirable sizes by passing the grains through a screen. A liquid is made free of large undesirable foreign matter by passing the liquid through a filter. The two processes are identical, for the action of the screen and the filter are the same.

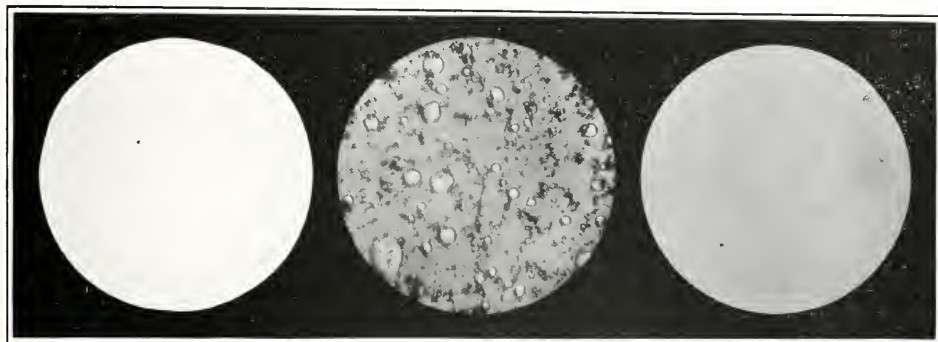
Filtration is a continuous method of removing impurities, in which method, time is not as much of a factor in determining its most perfect performance, as is the density of the filtering material. If the liquid be allowed to pass through some material having microscopically small openings, exactly uniform in size and shape, perfect filtration of the liquid would be the result.

It is easily seen that any conditions resulting in "Perfect Precipitation" or "Perfect Filtration" are too theoretical to be applied to Commercial Outfits for Oil Clarifying. The highest commercial degree of perfection is reached when the clarified oil has been freed from all injurious impurities and its condition returned to such a state, that, for the duty it is to perform, the oil is as good as new. To make it any better, would require an expenditure out of proportion to the gain of value in the oil.

In determining the proper method to use in clarifying an oil, consideration must be given to the

kind and degree of impurity it contains, together with the amount of oil to be handled and the amount of time that can be permitted for the clarification. Each factor has a distinct bearing on the selection of the proper method best suited to perform the duty. In actual practice, it is found that the best filtering conditions are obtained in a batch filter where the batch of dirty oil may be allowed to settle thoroughly in the receiving tank before the batch is slowly passed thru the filter proper. The oil is vastly cleaner after it is thus clarified than is possible with a continuous system. Nevertheless, conditions requiring the use of a continuous filter have to be met.

Magnified Oil Drops



New Oil

Used Oil

Purified Oil

Oil drops taken from an oiling system serving Vertical Cross-Compound Reciprocating Engines and magnified 500 diameters. The first specimen is new unused oil, clear, pure and perfectly transparent. The second specimen is the same oil after it has been used and collected in the drip pans, showing the entrained water, metallic particles, graphite, dirt and other impurities which make it unfit for use without purification. The third specimen is the same used oil after having passed through the filter and thoroughly purified. It is absolutely the same as new oil. This oil had been in use for approximately five months, and had passed over the bearings more than 1000 times.

Wayne Filters

Impurities. Wayne Filters embody the very latest approved scientific methods for separating from the large body of pure oil that amount of mechanical impurity and foreign matter that finds its way into it during its travel through the engine bearings, and which make the entire body of oil unfit for reuse until the impurity has been removed. These impurities consist of grit, lamp black, worn metal, animal fats, paraffine, grease slimes and water, but may be roughly classified as: first, those impurities heavier than oil; and second, as those impurities possessing the same weight as, or lighter than the oil in which they are being carried.

In Wayne Filters each of these two groups are removed separately from the body of clean oil. The first group, in which is found finely ground metal worn from the bearing surfaces, water, heavy residue, broken down oil, carbon, etc., is separated by precipitation thru the natural action of gravity. Positively all of the free and entrained water and

85% of the dirt found in the average used oil is removed in our patented separator. The second group, in which is contained animal fats, grease slimes, very fine carbon and substances that will not precipitate, is separated by filtration.

Wayne Filters. The Wayne Oil Filters are designed for use in connection with central oiling and filtration systems and may be arranged to be located on the engine room or the basement floor. The satisfactory operation of an Oiling and Filtration system depends more upon the filter than any of the other operations. Therefore, it might be well to consider briefly how the Wayne Filters operate and how they are applied to modern lubricating systems in order to fully appreciate the requirements of an efficient oil filter. These filters are designed for the small engine room, the machine shop, factories, or mills, as well as heavy power plant duty and will remove water, both free and entrained, sediment and mechanical impurities. Puri-

fied oil still possesses a small amount of very fine suspended dark pigment, which is so near the same specific gravity of the oil that it will remain in suspension a very long time. This suspended impurity slightly darkens the color of the oil, but is not of a gritty nature and will not injure the bearings.

Water Separation. A drop of lubricating oil is composed of thousands of minute globules or molecules of oil. In a pure oil that is highly refined, there is only a very small percentage of foreign matter between these molecules, and the molecules are very close together. A poorly refined or impure oil contains a great deal of foreign matter between the molecules, so that a drop of this sub-

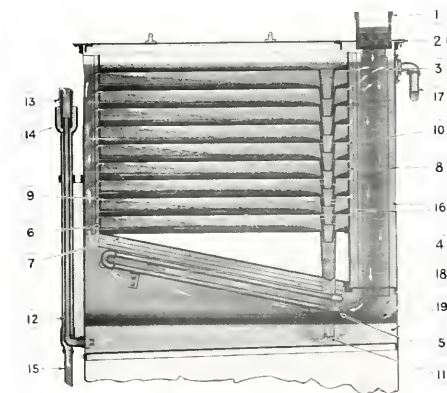
stance possesses only a few scattered molecules of real oil, and consequently is a poor lubricant. All used engine and turbine oils due to contact with steam, collect more or less water, which must be extracted during the filtering process. Free water, or water that is in no way mixed with the oil, will settle rapidly by gravity; that is, the water is so much heavier than the oil that it falls to the bottom of the containing vessel, while the oil rises to the surface of the water. The separation is complete and almost instantaneous. However, where live steam comes in contact with the oil, it is possible for the steam to become so entrapped in the body

of the oil that it will remain suspended in the oil as vapor until a point of saturation is reached, above which, the steam will collect and separate as free water. This entrained water that has been trapped between the minute globules of oil will not settle out by gravity under ordinary conditions—no matter how long the oil may remain in a state of rest. It must be remembered that every molecule of foreign matter contained in the oil, including entrained water, is so covered with a coat of oil that the oil prevents the particle from separating.

Action of Heat. When oil is heated to a temperature of approximately 180 degrees Fahr., the cohesive force between the oil globules is temporarily weakened, sufficiently to spread the globules apart and to release the foreign impurities which are entrapped between them. This cohesive force or viscosity, possessed by the oil, is a very necessary lubricating property. Nevertheless, this physical property must be temporarily changed during the process of purification. Increasing the temperature of the oil reduces this viscosity, and at a temperature near 180 degrees Fahr., depending upon the quality of the oil, the oil loses its cohesive force and becomes "thin" as water. While at this temperature, if it be allowed to remain approximately in a state of rest for a comparatively short time, all the water and other impurities heavier than the oil will precipitate. It is upon this principle that the separator in the Wayne Filter is based. So efficient is its action that only a very small per cent of the impurity is left to be removed by the Filter Strainer Unit.

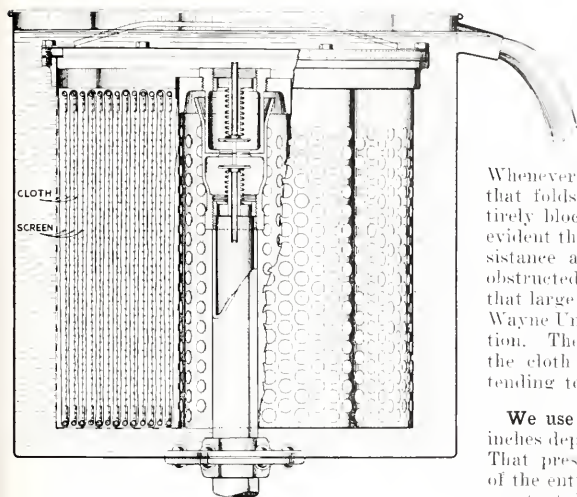
Filter Medium. Every oil purifier uses some kind of various filtering materials through which the oil is passed in order to remove from the oil, those impurities that will not settle by gravity. The majority of filters use charcoal, excelsior, Fuller's earth, bone dust, cotton waste or sand, and some of the earliest types passed the oil through water with the intention of washing the dirt out of the oil. This water washing theory was the basis upon which most every filter was operated, until a very short time ago. It will only take a very little thought to realize the fallacy of this absurd theory. In the first place, oil is lighter than water, and any impurities which may be in the oil will not settle to the bottom of the water, because they are oil coated and will float on the water. Drops or streams of oil cannot let go any of these impurities, because of the cohesive force holding the drop of oil together. On the contrary, during its passage through the water, the oil will catch, absorb and retain the all impurities which may be in the water. **Due to the viscosity of the oil, the oil purifies the water.** Notice how clean the water is in the sight glass of the hydrostatic lubricator that feeds oil into the engine cylinder, and note how the oil always rises through this body of water in solid drops or streams.

There are many lubricating oils that emulsify readily with water when the two are brought into



- (1) Screen Box, (2) Brass Screen, (3) Conductor to heating chamber, (4) Heating Chamber, (5) Heating Coil, (6) Lower Tray with (7) Insulated Bottom, (8) Precipitation Trays, (9) Space between trays for entrance of oil, (10) Space for exit of oil, (11) Water spout from trays, (12) Automatic Water Overflow, (13) Adjustable Water Spill, (14) Spill Cup, (15) Water line to sewer, (16) Collection Header, (17) Connection to Cloth Filter Unites, (18) Sludge, (19) Settled Water.

stance possesses only a few scattered molecules of real oil, and consequently is a poor lubricant. All used engine and turbine oils due to contact with steam, collect more or less water, which must be extracted during the filtering process. Free water, or water that is in no way mixed with the oil, will settle rapidly by gravity; that is, the water is so much heavier than the oil that it falls to the bottom of the containing vessel, while the oil rises to the surface of the water. The separation is complete and almost instantaneous. However, where live steam comes in contact with the oil, it is possible for the steam to become so entrapped in the body



The Wayne Filter Unit

intimate contact. These oils will pick up the water and carry it in small suspended molecules. If enough oil comes in contact with the water, the body of the water will entirely disappear as free water and will be found mixed with the oil.

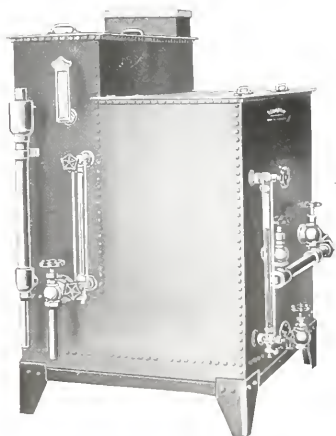
In the selection of a proper filtering material through which the oil is to be passed in order to separate the impurity of lighter weight than the oil, care must be taken to choose some material that is cheap, something that will not dissolve or possess fine particles that will work into the oil and find their way to the bearings to clog and injure them. The material must be such, as to provide uniform microscopically small voids or openings for the passage of oil, so that the straining action may be uniformly complete. The material must be such that an extended area of straining surface can be provided for the oil, because it is the area of surface and not the depth of medium that does the straining. In passing a dry material through a number of screens of the same mesh, it is the first screen that does all of the separation. Any size that will pass through the first screen, will pass through each of the succeeding screens having the same size openings, no matter how numerous these screens may be. The material must also be such that it may be adapted to the best approved mechanical arrangement.

The Filter Strainer medium in the Wayne Filter has been selected with the greatest care after a series of thorough tests, proving quality and capacity of the different materials as well as durability of service. We have found that the material best suited to perform these duties is a very closely woven special grade of cotton cloth, the body of which is firm and strong enough to withstand thorough cleanings.

Filter Unit. The Wayne Filter Unit is made in two sizes containing twenty-two square feet and forty-four square feet of filter cloth respectively. The cloth in each unit is in one piece and supported in such a manner that it is free from folds. This makes possible every square inch of filtering surface.

Whenever a filter cloth is gathered together so that folds occur, if the passage of oil is not entirely blocked, a condition exists from which it is evident that the oil will follow the path of least resistance and will only flow thru the single unobstructed thickness of cloth, rendering ineffective that large per cent of wadded filter medium. In the Wayne Unit, the cloth is arranged in a vertical position. The slime and sediment that collects upon the cloth continually, works toward the bottom, tending to keep a clean exposed surface.

We use a constant pressure head of four to six inches depending upon the class of oil to be filtered. That pressure is uniform over every square inch of the entire area of cloth in each unit and remains constant during its entire period of use. When it is necessary to gradually build up a high pressure head upon the filtering medium in order to get continued capacity, the pressure is built up automatically as the sediment accumulates and forces a stream of dirt as well as oil through the cloth, which otherwise would be completely obstructed. When the operating pressure is uniform, the lower stratum of filter medium possesses a greater activity than the topmost meshes, due to a greater head of oil above it causing a very uneven flow of oil and consequently an unsatisfactory filtering operation. In such an arrangement, it is never possible to tell at which pressure the oil is passing, or which portion of the medium is working.



Wayne Type C Oil Filter

The Wayne Filter Unit is completely submerged in clean oil, which positively places the same pressure upon each unit of filtering surface. It is best practice not to crowd the filtering action by any pressure greater than six inches, for no matter how fine the filter medium may be, any pressure above that, necessary to let the oil flow through a reasonably clean cloth, will force through a per cent of impurities directly proportioned to the pressure applied.

The Special Filter Cloth used in the Wayne Filter is tightly woven and has a body heavy enough to cause the oil to pass from one side to the other due to its capillary action, as well as by its direct filtering action. Capillary action cannot be forced. If greater filtering capacity is needed, more units should be added. However, it will be found that our tray system in the precipitation compartment, which is a feature of our patented filter, will separ-

ate and retain eighty-five per cent of the total dirt to be caught in the filter.

Our separator greatly protects our filter medium, relieving it of the heavy duty and imposing upon it, only the work of filtering from the oil, those very fine coagulated flakes and light weight suspended matter. This gives the filter cloth much more capacity than it otherwise would have and at the same time reduces to the very extreme limit, the number of cleanings that any filter cloth must necessarily be given.

Considering as a whole, all the elements connected with the operation of an oil clarifier, we have embodied in the Wayne Filter those principles of refinement, which in a practical outfit for oil clarifying, approach to a very close degree those theoretical principles of "Perfect Filtration." Our filters are designed to meet the latest engineering practice and incorporate every essential feature necessary for scientific oil purification.

Oil Filtration for Steam Turbines

Classified according to the methods used in handling their lubrication, steam turbines may generally be divided into two divisions, viz: the Horizontal Turbine, with its self-contained lubricating system; and the Vertical Turbine, dependent upon its lubrication from some outside source.

Horizontal Turbines: All horizontal turbo-generating units, as they are designed today, are equipped with a self-contained oiling system, through which a flood of oil is circulated to the large bearings by means of a pump, which is usually gear-driven from the spindle. Every unit comprising this system is located in the machine itself. The oil reservoir, cooling coils, circulating pump and strainer are built in the base, where they occupy unused space and receive very little attention.

As long as a bearing does not develop a temperature that is dangerous for the continuous operation of the machine, and as long as the machine is not shut down for some other cause, the small batch of oil contained in the circulation system is allowed to run continuously for three to six months or even a year without ever being removed. Beyond observing the height of the oil in the gauge glass, the average operating engineer will seldom look at the oil.

No provision whatever is made in the turbines for the removal of water and foreign matter as it accumulates in the oil. Water finds its way into the oil through the packing glands at the high pressure end of the turbine. Various methods of sealing these glands are employed by manufacturers for preventing steam leakage at this point, but they are never perfect. In spite of these precautions, steam will travel along the spindle and condense on the bearing where it will be taken up into the oil. Large bearings are water cooled, and these often develop leaks which permit the water to get into the oil. The water mixes with the oil at a high velocity. The result is an emulsion which does not contain good lubricating qualities. The water must

be removed before the oil is fit for re-use. The cohesive property of the oil acting on the entrained particles of finely divided water makes the mixture very hard to separate.

Mechanical impurities find their way into the oil and the soapy residue, the result of saponification of improper oil, is often found in varying quantities. These are left to collect in the reservoir and foul the oil that is being delivered to the bearings. When the operating engineer does clean his reservoir, he is so astonished at the condition of his oil and the accumulation of dirt and filth that it contains that he thinks it is better for him to throw away this batch of dirty oil and replace it with new, rather than to take any chance of injuring his bearings and making a costly shut-down.

In this opinion the engineer is correct, provided, of course, there were no way of purifying the dirty batch by removing all the contained impurities.

Lubricating oil never wears out. Experiments made to determine whether oil "wears out" when used continuously in circulating systems have determined conclusively that oil gains in gravity and viscosity due to its volatile constituents having been driven off by the heat of the bearing. It possesses a slightly higher coefficient of friction for high bearing pressures and a slightly lower coefficient of friction for lower pressures, as compared to the tests on new, unused oil. Therefore, by the use of a device which will positively remove these impurities and make oil as good as new, these batches of dirty turbine oil need never be thrown away. The good oil may be reclaimed and used over and over again. It is possible, by the frequent use of a Wayne Batch Filter, to keep the oil just as pure and clean as it was the day it was put in the turbine. The advantages of filtered oil at frequent intervals, will require, for the machine, less attention, due to the non-heating of the bearings, and will positively eliminate any cause for shut-down on account of improper lubrication.

Vertical Turbines: The vertical steam turbo-generator is becoming an obsolete type of power unit, although there are quite a number of this type of turbine in existence today. One reason for their going out of popular use is due to the fact that their step bearing is difficult to maintain. The entire weight of the rotor plus the push of the motive power is resisted by a pressure of the oil, which is forced between the contact surfaces of the step bearing and keeps them separated.

All of the units comprising the circulation systems on most vertical turbines are located outside of the machine, and consist of a storage tank low enough to receive all of the oil by gravity from all points of lubrication, in which is provided a cooling coil and straining devices; and a pump which draws the oil from the tank and delivers it at a pressure approximately 25% higher than is required to sustain the weight of the revolving element.

In considering the condition of the oil after it has been in use for some time, you will realize that oil in the vertical turbine is much the same from the standpoint of impurities as the oil found in the horizontal turbine, with the exception that the emulsion contains much more water. This excess water occurs as a result of leaky seals, which seals in the vertical turbines are much harder to maintain. The great pressure at which the oil must enter the bearings, the high temperature at which the steam comes in contact with the oil and the excessive speed at which the liquid is churned, results in an emulsion, from which the water content is very hard to separate.

Oiling and Filtering Systems for steam turbines may be classified as follows:

(A) **BATCH FILTRATION**, in which the entire quantity of oil in the turbine is drained at stated intervals from the reservoir to be clarified, while the clean batch of purified oil is returned to the turbine reservoir.

(B) **CONTINUOUS FILTRATION**, in which the quantity of oil circulated is constantly filtered.

(C) **PARTIAL FILTRATION**, in which a continuous stream of the dirtiest oil is passed through a filter and returned to the circulation system.

Batch Filtration: Batch system of filtration may be used on all except very small turbine units. It is readily understood that a continuous system of filtration is not applicable to steam turbines, when it is realized that in the average size turbine the quantity of oil circulated per minute is too great for a continuous filter to handle successfully.

The operation of Batch Filter is as follows: The entire batch of dirty oil is drained from the turbine by gravity into the receiving tank after it was passed through a screen basket in which is caught all of the coarse particles of dirt. Here the oil is kept warm by steam coils and allowed to remain at rest while most of the heavy impurities and all of the free water settles to the bottom of the compartment. After several hours the oil is slowly run through the filtration compartment.

The greatest advantage of batch filtering lies in

the amount of time which may be given to the settling action. Heat, time and gravity are the three important agencies that will purify dirty oil. It is only in the batch filter that the advantages of time may be realized to their fullest extent.

The filtration compartment contains a number of Wayne Filter Units, the action of which has been described elsewhere. The best results of filtration are obtained at the slowest possible rate of flow. If twelve hours are available for handling the batch of oil, the flow may be adjusted to permit this batch to pass through in twelve hours. By taking advantage of the most time available for filtration, the better the purification will be. The clean oil compartment possesses capacity sufficient to contain the full batch of filtered oil, and serves as a storage until the oil is returned to the Turbine Circulation System.

Continuous Filtration: On very small turbine units where the total quantity of circulating oil is relatively small, the system of continuous filtration may be used. This system is identical with that used on the reciprocating pumps and engines. It contains the overhead reservoir, from which the oil is piped to the various bearings on the turbine; a drain tank with filter is located below the engine room floor; and the pump to lift the clean oil to the overhead reservoir again.

Partial Filtration: Partial Filtration is a method of continuously removing a part of the dirty oil, filtering it and returning it to the system in a continuous stream. On large turbines in central stations, it is sometimes not convenient to shut down a turbine so that the oil can be filtered as often as it should be. In this case, a circulating filter is installed that will receive by overflow and return to the turbine a certain percentage of the total batch each hour. What percentage this should be is governed by the kind of oil used, the amount of water that is getting into it, the condition of the bearings, the amount of oil in the turbines, and its rate of circulation to the bearings.

We have observed numerous conditions, and believe that if 10% of the batch passes through the filter each hour the oil will be kept in good condition. The oil should be taken from the lowest point in the reservoir and allowed to raise to an overflow sight, set to maintain a given level in the turbine, before it runs to the filter. From the clean oil compartment of the filter it is pumped back to the turbine reservoir.

It is desirable to add to this system a storage tank large enough to hold the entire batch of oil so that when the turbine is shut down, all of the oil may be run through the filter into the storage tank before any oil is returned to the turbine. The filter should not be required to work to capacity when changing 10% of the oil per hour, but should be large enough to clean the entire quantity of oil in from three to four hours.

The principal reason for turbine oil filtration is to prevent the forming of an emulsion of oil and water, and of sludge; which, when passed over the

bearings, stops up the oil grooves. The heat of the bearings, with the constant circulation of air through the oil, causes this sludge to form a mineral acid known as SO_2 , which in turn breaks down the good oil.

Filtration of Cutting Oils

The study of the art of cutting metals, the development of high speed steel and the designing of the remarkably efficient automatic machine tools with the aim to increase machine production and to reduce costs has been the work of many of our very prominent manufacturing engineers. The improvements in these fields mark a wonderful record in the history of Machine Shop practice, but their development is reaching its limit.

Manufacturers are now looking toward and taking advantage of the many opportunities afforded them to greatly increased production and to reduce the cost of machine tool work through other means, the most important of which is the abundant use of a very effective cutting lubricant. The importance of a flood of clean, high grade cutting oil, flowing on tool and work, is very apparent and the advantages gained are manifold. A flood of physically clean, high grade oil may be continually had at a very little expense through the use of a Wayne System of Cutting Oil Purification.

The filtration of cutting oil is just as important to the small shop with a few machines as to the large shop with a battery of a hundred or more large automatics. Would any manufacturer buy new cutting oil at even five cents a gallon that was filled with a heavy metallic sediment? This he is doing, in effect, when he puts unfiltered cutting oil back into the machines from the chip separator.

Other of the many advantages resulting in the use of a Wayne Cutting Oil Filtration System are here briefly summarized:

1. Decreases the cost of labor.
2. The elimination of scale, metallic chips and other foreign substances from the cutting oil prevents the tools from becoming dull, resulting in
 - (a) Increased life of tools.
 - (b) Higher speed of operation.
 - (c) Reduction of the loss of time due to the sharpening of tools.
 - (d) Decreased consumption of power.
 - (e) Increased accuracy.
3. As the oil is used over and over again, a high grade of oil may be employed.
4. Saves the oil wasted in filling and emptying container and machines, and increases the general cleanliness of the plant.
5. Oil is returned to the tools as clean as new oil.
 - (a) Increases the lubricating value.
 - (b) Decreases its tendency to oxidize and cause the slides to gum and stick.
 - (c) Reduces wear and tear on machines.

If 10% of the contents of the turbine reservoir is removed from the bottom of the reservoir each hour, the oil will not have an opportunity to emulsify under normal conditions, and the breaking down of the oil will be impossible.

There are five primary functions of the Cutting Lubricant:

1. To carry off the heat developed from separating the chips from the work and thereby preventing a rise in temperature from the formation of such heat.
2. To lubricate the chip as it slides over the tool or the work and thereby reduce the friction heat.
3. To improve the finish of the work and guard against rust.
4. To decrease tool maintenance.
5. To flush out the cutting area and to wash out the small chips.

Practically every manufacturer realizes the advantage in using good lard oil compounds or mineral oils as cutting lubricants instead of soluble oils on many of the different machining operations on certain metals. Each kind of cutting oil is best adapted for certain classes of work. Often both lard oil compounds and soluble oils are recommended for the same purpose on similar material. The selection between the two groups of cutting lubricants depends upon the special conditions and machine shop policy.

The only thing that recommends the soluble oils on certain work is their cheapness. The matter of expense is not so important when a Filtration System is installed, for the cutting oil really becomes an investment and may be used over and over again.

It is through a system that will keep the cutting oil pure and clean without those wasteful methods of handling that secures for a machine shop that increased cutting speed and other production values that can only be derived from a very efficient cutting lubricant.

Cutting Oil Filtration may be handled in three styles of systems: Batch, Periodical and Continuous Circulating Systems.

Batch Filtration: Reclaimed cutting oil as it is drained from the chip separators may be thoroughly purified, and the cleaned oil may be returned to the machine reservoirs for re-use. Dirty oil from the chip separators is best handled in a Batch Filter. The size of the filter depends entirely upon the amount of oil reclaimed each day from the chips. The Wayne Type II and Type B Filters are both designed to handle oil in batches. The Type II Filters are small portable sizes to handle small batches, while the Type B Filters are designed primarily as cutting oil batch filters to handle any amount per day. An exclusive feature in these B filters is the steam jacketed oil

conductor from the precipitation chamber to the Filter Unit. Heat applied to the precipitated cutting oil, just before it is passed through the filtering medium, thins the liquid so that cutting oil, possessing a large amount of lard content, will not coagulate and be retained on the filter cloth. It also obviates the necessity of reheating oil in precipitation chamber, causing a disturbing agitation to the precipitated oil and its sediment.

The use of a Wayne Batch Filter that will hold one day's run of oil from the chip separator in its precipitation compartment will be found to be a most valuable asset in any machine shop where cutting oil is used.

Periodical Filtration of Cutting Oils: Periodical Filtration of Cutting Oils is attained by not only filtering oil from chip separator but in addition by completely draining the oil from the machines by gravity at stated intervals, purifying it and returning same to the oil reservoir in each

machine. Such a method of handling cutting oil is accomplished by the Wayne B type Filter, in connection with a power pump and a gravity tank. All machines need not be cleaned every day so that abnormal filtering capacity is not necessary. The time that should be allowed for the dirty oil to precipitate depends upon the size of the batch and the quality of the oil. This time will vary from one hour to one day.

Circulating Systems: In a Wayne Filtration and Circulating System for handling cutting oils the entire quantity of oil passing over the tools and work is continually drained from the machine, purified and cleansed from all forms of impurity which it has picked up in its travels over the tools and work and is lifted up to an overhead gravity tank from where a continuous stream of cool, clean oil is allowed to flow again to the various machines. Such a method as this is ideal if the cost of piping is not prohibitive and the location of the machines is permanent.

How to Determine the Type and Size of an Oiling System

So many factors enter into the proper selection of an oiling system that it is almost impossible to condense them into a fixed set of rules. Local conditions, such as arrangement of a plant, type of engines, grouping of units, the daily program of events and kind of oil, all govern the type of oiling and circulation system to be used.

Some plants are so arranged that the units are separated and because of the construction of the masonry work, foundations and other barriers, common supply headers or common drain headers cannot be used. An Individual Oiling System for each unit, or group of units, can only serve such a lay-out when a Central System cannot be installed. Or, it may be that only part of the plant

is run all of the time while the other part is laying idle. In this case, two separate systems would prove more satisfactory than one large system. Then again, a large plant may be in such service that every extreme precaution must be taken to prevent any accident putting the whole plant out of commission. There is less danger from unforeseen trouble in lubricating systems when each unit possesses an Individual Circulating System.

In figuring the capacity of an oiling system, it is poor engineering to underestimate the requirements. The following table contains the capacities per horse-power that have proven satisfactory under average conditions, and will give, in round figures, the necessary amount of oil to be stream fed to the bearings.

Filtering Capacities for Gravity System to Supply Slow-Speed and Medium-Speed Engines

Note—For High Speed Engines These Quantities Should be Increased about 30%.

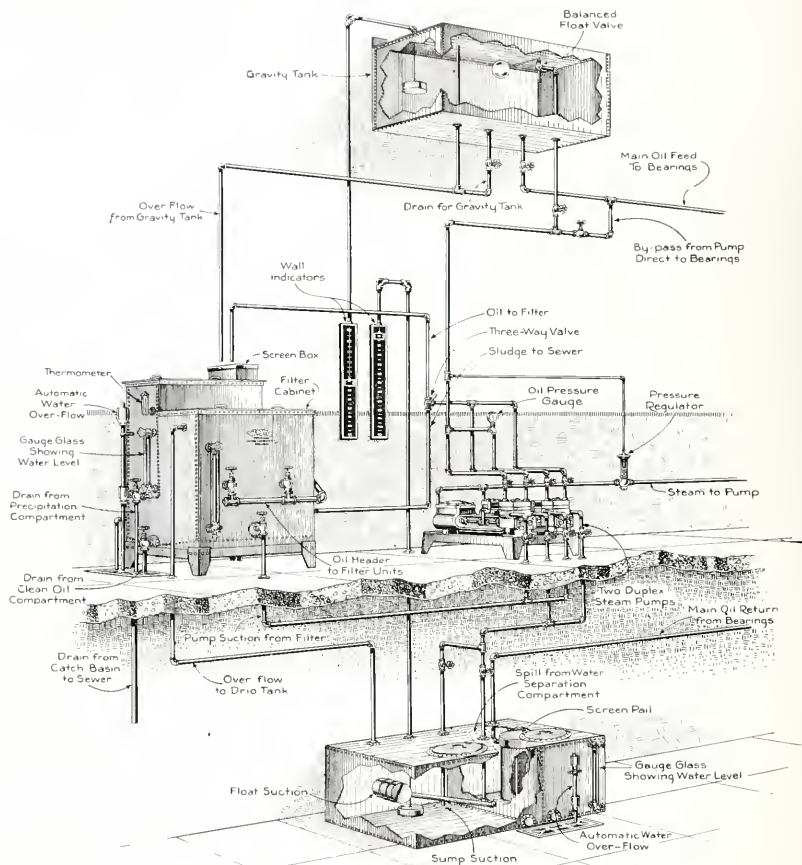
Note—Engines running at 150-300 R. P. M. are classified as high speed.

Engines running at 125-150 R. P. M. are classified as medium speed.

Engines running at 75-125 R. P. M. are classified as slow speed.

Engines running at 75 R. P. M. are classified as very slow speed.

	Min. Hourly Filtering Cap Necessary		Min. Hourly Filtering Cap Necessary
100 Horsepower	4.25	550 Horsepower	13.00
150 Horsepower	5.00	600 Horsepower	14.00
200 Horsepower	6.00	750 Horsepower	18.00
250 Horsepower	7.00	1000 Horsepower	22.00
300 Horsepower	8.00	1250 Horsepower	27.00
350 Horsepower	9.00	1500 Horsepower	45.00
400 Horsepower	10.00	2000 Horsepower	75.00
450 Horsepower	11.00	2500 Horsepower	110.00
500 Horsepower	12.00	3000 Horsepower	145.00



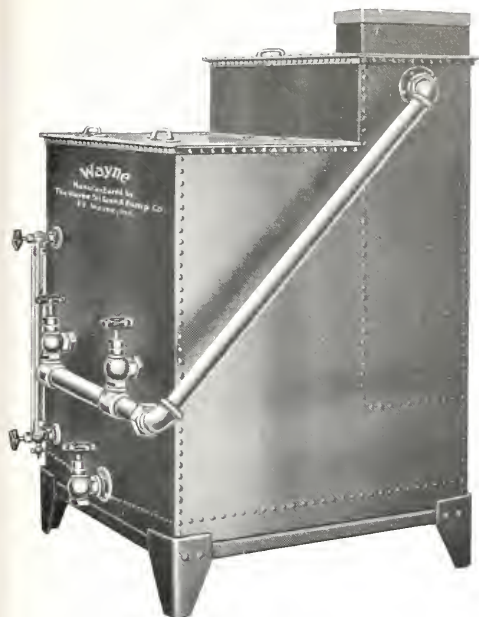
General Arrangement of Type CA System

The amount of oil to be put on a bearing is proportional to the speed and projected area of the bearing to be lubricated, and is roughly estimated for medium speeds at five (5) gallons per hour per square foot of projected area. This is only a "rule of the thumb" method of estimation to be used on average sized bearings. For small bearings the quantity per hour should be increased considerably from the results of this rule. A mistake can never be made by furnishing too much oil to a bearing or by selecting the capacity of filter to take care of a big overload. The best filtration results are obtained in a filter that can never be crowded.

The overhead reservoir or gravity tank should contain enough capacity to supply the system for

at least two hours and should be at such elevation that a constant flow of oil will be insured to all points of lubrication.

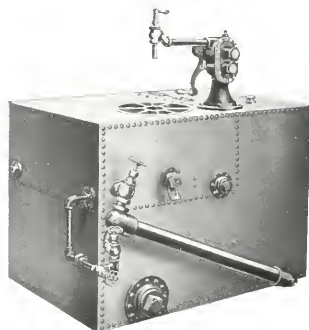
The selection of a type of system for a plant is best made by the chief engineer of the plant, for it is he who knows better than anyone else the kind of service that is required of the units in his charge. He must decide whether his oil can best be filtered continuously or by the batch. The filtering operation is more thorough by the batch method, but often the necessary time cannot be spared. Continuous methods of filtration are desired for units that can run continuously during long periods without intermissions and require positive delivery of clean, cool oil.



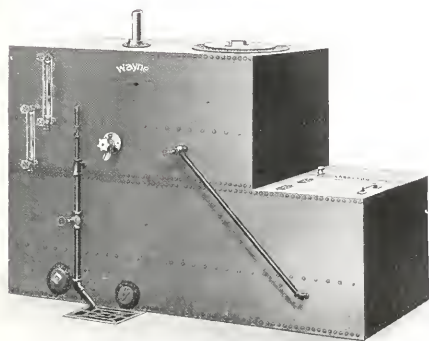
Type C Filter
For Continuous Flow Circulating
Systems



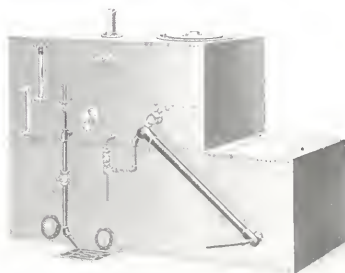
Type H Filter
For Small Batches



Type B1 Filter
For Cutting Oil



Type T Filter
For Turbine Oil
in Batches



Type B3 Filter
For Cutting Oil
in Batches

List of Wayne Filtration Bulletins

TYPE E FILTER—Small continuous flow type, built to handle 4 to 60 gallons of oil per hour, and adapted particularly for small plants or individual engine lubrication.

TYPE T SYSTEM—A system designed to handle oil in batches of 35 gallons to 6,000 gallons per day. To be used on Turbine oil or Engine oil in any service where a continuous flow is not required.

TYPE B SYSTEM—A system designed to handle cutting oil in batches of 35 gallons to 6,000 gallons per days.

TYPE C SYSTEM—Built to handle all kinds of oil in a continuous flow and in quantities ranging in capacity from 50 gallons per hour to any amount. The system is composed of two major units—Filter and Gravity Tank. The Filter must be located below the engine room floor.

TYPE CA SYSTEM—For the same service as the Type C System. A Drip Tank has been added to the system in order that the Filter may be located on the engine room floor. Basements or pits do not always provide enough head room for the Filter to be placed in them. Some operating engineers prefer to have the Filter on the main floor. It is to meet such conditions as these that the drip tank has been added.

TYPE H FILTER—Small portable type to be used for hand caught drips. Are furnished in capacities to handle from 25 gallons to 360 gallons per day.

Wayne Guarantee

Wayne Filters are built to fulfill every demand and every requirement of a modern power plant and are sold under a guarantee against imperfections of material and workmanship. They are positively guaranteed to operate satisfactorily when installed and operated in accordance with our directions.

Wayne Systems

We furnish everything necessary for a complete filtration system. The customer need only secure pipe and fittings to connect the units of the system. A Wayne Filter is not the filter cabinet alone but includes the necessary gravity tank, sump tank, pumps and wall gauges that go to make a complete system.

Wayne Free Consultation Service

At our Home Office and at each of our Branch Offices throughout the country, we maintain a force of engineers who are competent to aid you in determining the proper oil filtration system to meet your requirements. We can help you to cut your lubrication costs. There is no charge or obligation on your part for this service.

REG. U. S.
Wayne
TRADE MARK

Type C Oil Filtration System

BULLETIN No. 5500



Filter Cabinet

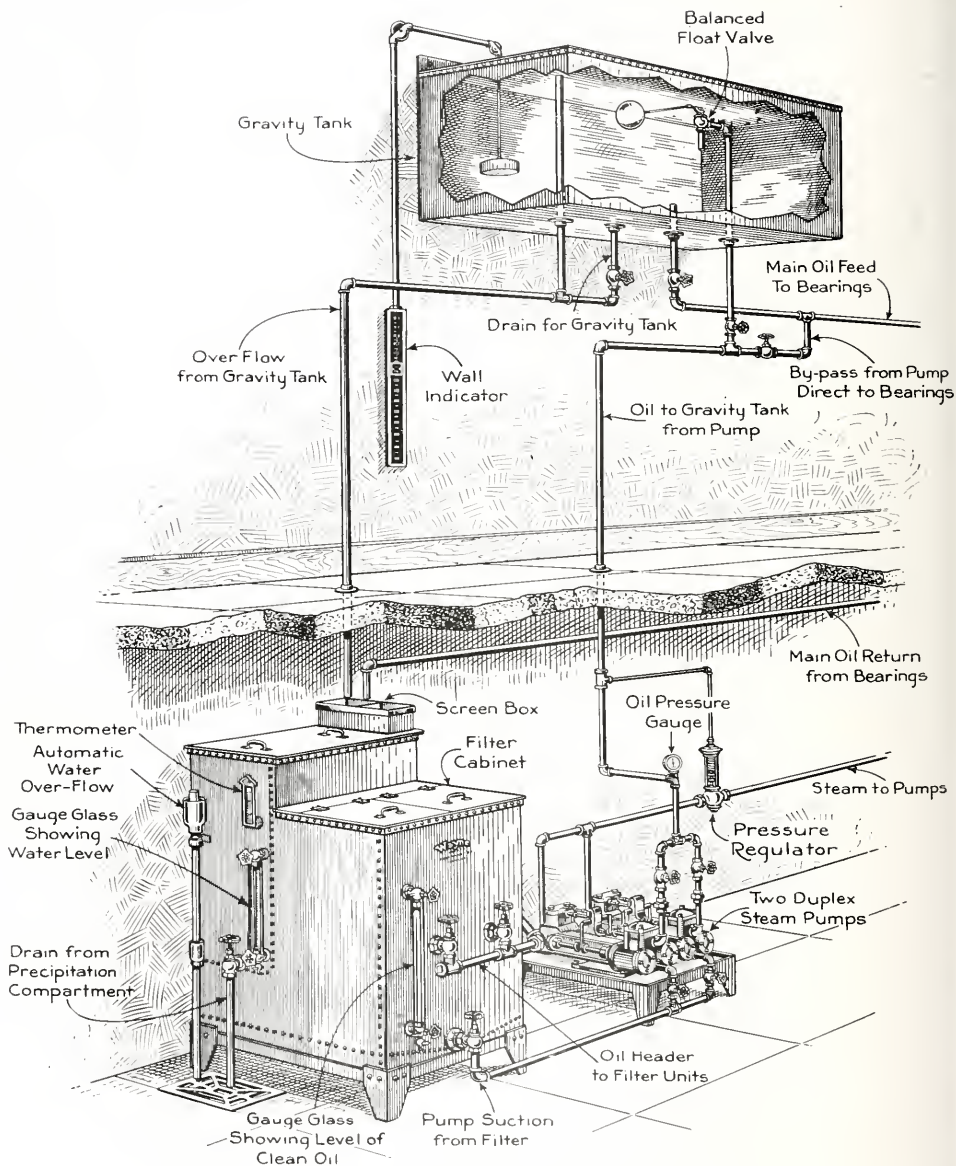
Wayne Filters Are Easy to Clean

Wayne Oil Tank & Pump Company

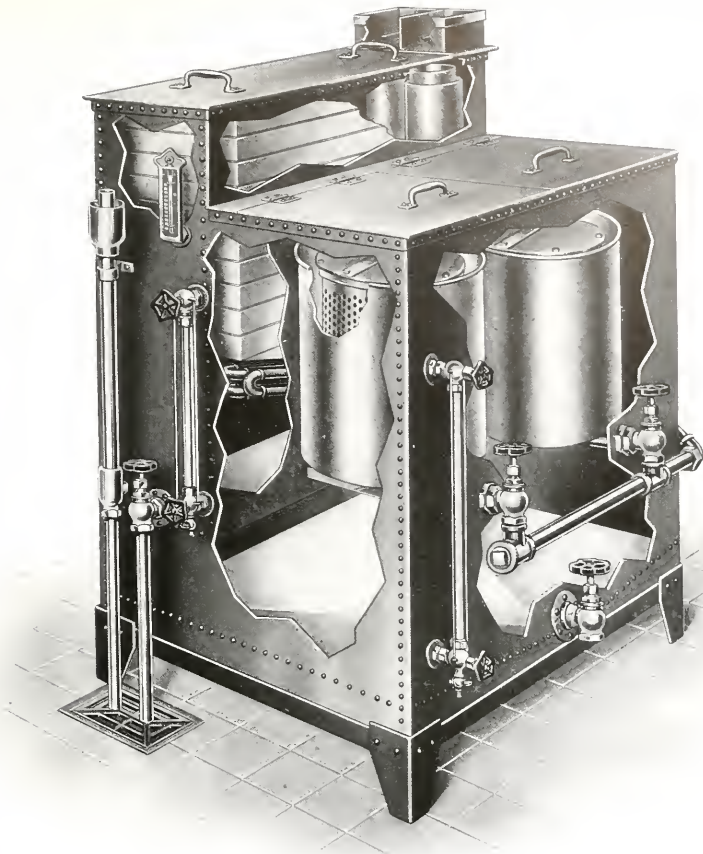
Branch Offices in Principal Cities—Salesmen Everywhere

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Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
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General Arrangement of Type C System
Wayne Filters Are Easy to Clean



Wayne Filters Are Easy to Clean

Wayne Type C Oil Filtering and Circulating System

INTRODUCTION

The Wayne Type C System has been designed to meet all the conditions where a continuous flow of clean, pure oil is required. The science of lubrication has developed to such a point that no power plant can afford to use the old fashioned method of hand oiling. The high cost of poor lubrication, coupled with the enormous annual loss due to wasteful methods of handling and using of oils, is making the power user realize that it is time to apply efficiency to his oiling system. He is using scientific means for the selection of the proper grade of lubricant especially adapted to his particular engine requirements and he is demanding that his high grade oil be conserved, reclaimed and used over and over.

The Type C System is adapted for use with Re-

ciprocating Steam Engines, Gas Engines, Diesel Engines, Electric Motor Drives and Turbines where a partial or complete circulation of oil is desired.

The two most important elements in a continuous circulating filter are the elimination of dirt and water, and the ease of cleaning the filter. These elements were constantly before our engineers during the designing of this filter. Operating experience has shown that the Wayne Type C Filter will absolutely eliminate dirt and water under the worst possible conditions and can be cleaned with a minimum of both trouble and frequency. Provision is made for taking the accumulated dirt and slime from the filter without removing the oil. We wish to call particular attention to the section of this bulletin headed "Cleaning".

OPERATION

The Type C System is composed of two units, the filter cabinet and the gravity tank, and contemplates the placing of the filter cabinet in the basement so that it will receive the oil from the bearings by gravity. If from choice or physical conditions, it is not practical to place the filter tank below the level of the bearings, a third unit, the drip tank, is provided, and the system is then known as the Wayne Type CA System.

From the gravity tank, which is located well above the bearings to be lubricated, the oil flows to the bearings in a sufficient quantity to provide a stream of pure, clean oil on every bearing. From the oil guards, or reservoirs, below the bearings, the oil is collected by means of drip mains and carried by gravity to the filter. In the filter the coarse impurities are screened out. Water is separated from the oil. The oil is allowed to precipitate and is then passed through the cloth filtering medium. It is now clean, pure oil and is pumped again to the gravity tank to be used once more.

DESCRIPTION IN DETAIL

Gravity Tank:

A Gravity Tank is provided of sufficient capacity to hold a two hours' supply of oil to all bearings. This tank is made of galvanized steel and constructed with absolutely leak-tight seams. The large size tanks are suitably reinforced with stays and stiffeners.

The Gravity Tank is fitted with a 15" manhole with steel cover and lock. There will be the necessary flanges for fill, draw-off, overflow and float gauge. Also two steam coil flanges will be provided and plugged unless a steam coil is necessary, in which case it is an accessory.

All flanges are made of malleable iron, riveted to the tank and flushed with solder.

An overflow fitting is provided inside the tank from the overflow flange to carry surplus oil back to the clean oil compartment of the filter.

Float Gauge:

The Gravity Tank is equipped with our Cut 332 storage indicator, showing at all times the contents of oil.

Filter Cabinet:

The oil coming from the bearings enters the filter cabinet through a heavy brass wire screen, passes to the heating compartment, thence through the precipitating chamber and from there to the filter units, and from these units to the clean oil compartment.

Brass Screen:

A brass screen is provided where the dirty oil enters the filter to take out the coarse impurities. It is so constructed that if it becomes clogged with impurities, the oil will overflow into the filter and not onto the floor.

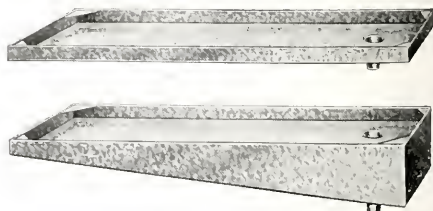
Heating Compartment:

The oil leaving the screen passes downward and thence latterly over the heating coils, which are provided in sufficient capacity to raise the temperature of the oil to 180 degrees Fahrenheit. This reduces its viscosity, or thins it, placing it in a condition to release the entrained water that it may have gathered from the engine or bearing and to allow the fine impurities to precipitate.

Precipitation Chamber:

The oil runs from the heating compartment to a point opposite one end only of the precipitation trays. A maximum amount of precipitation is provided, thereby eliminating frequent cleaning of the cloth filter units. Precipitation and rest are in direct proportion to each other and great care is given this feature of the Wayne Type C Filter. The proper proportion of heating surface and of precipitation surface is maintained throughout the different sizes of this filter, as well as the ratio of precipitation surface to cloth straining surface.

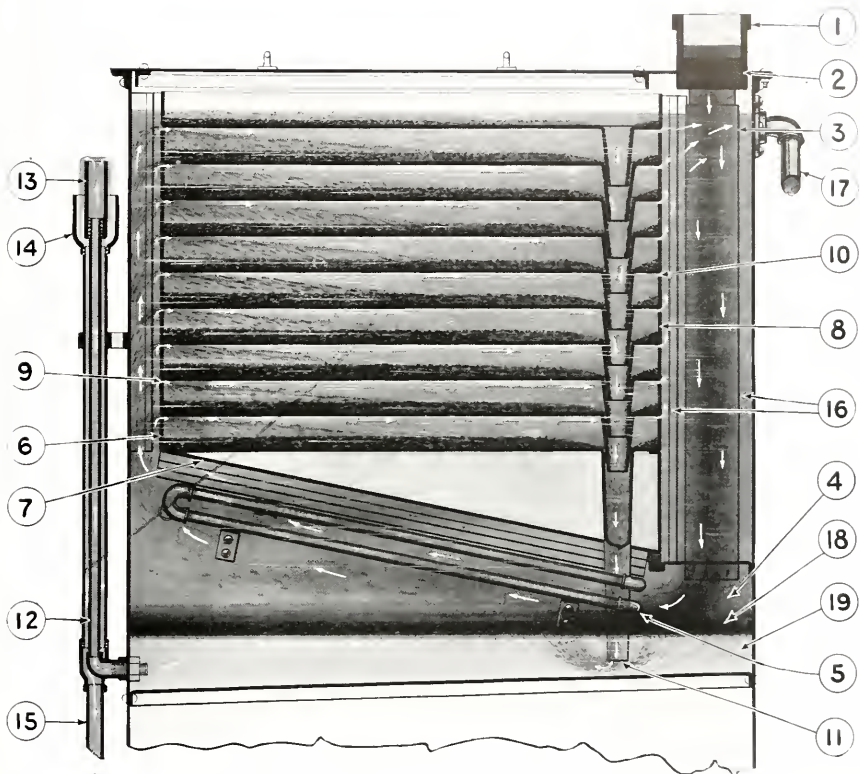
The precipitation chamber is completely filled with shallow trays arranged in multiple to give the greatest area and, therefore, the longest period of time for a given volume of oil. These trays are placed directly over the steam coil and are insulated from it by an air chamber so that the precipitation in the trays is not being continually agitated by direct heat. The space between each tray is about 1/32" and only a given fraction of the total volume of oil passes through this space and latterly over a given tray.



Precipitation Trays

Note that lower tray is provided with an air space for insulation from heating coil.

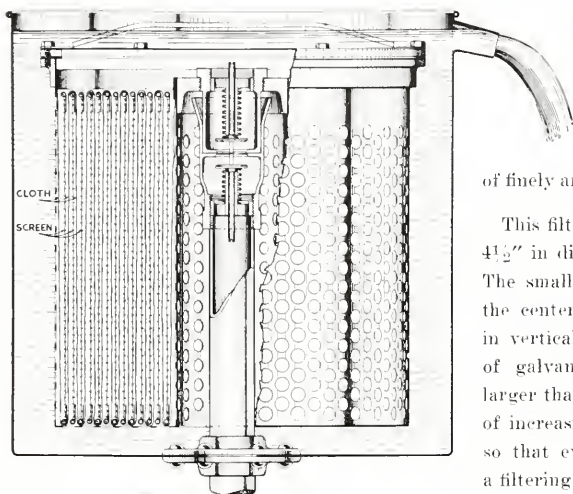
The oil passes lengthwise of the trays so slowly that approximately 85% of its impurities are deposited on the trays. This method of splitting the volume of oil into equal parts and passing each part



Sectional View of Precipitation Compartment.

Wayne Filters Are Easy to Clean

(1) Screen Box, (2) Brass Screen, (3) Conductor to heating chamber, (4) Heating Chamber, (5) Heating Coil, (6) Lower Tray with (7) Insulated Bottom, (8) Precipitation Trays, (9) Space between trays for entrance of oil, (10) Space for exit of oil, (11) Water spout from trays, (12) Automatic Water Overflow, (13) Adjustable Water Spill, (14) Spill Cup, (15) Water line to sewer, (16) Collection Header, (17) Connection to Cloth Filter Units, (18) Sludge, (19) Settled Water.



The Wayne Filter Unit

Wayne Filters Are Easy to Clean

slowly over a precipitation tray is an exclusive Wayne feature.

Water:

The great percentage of the water which may be in the dirty oil leaves it as it passes over the steam coils and descends to the bottom of the dirty oil tank. The remainder of the water will settle from the oil in its slow travel over the precipitation trays and an outlet for it is provided from each tray to the bottom of the dirty oil chamber.

Automatic Water Overflow:

The automatic water overflow is connected by a flange to the bottom of the dirty oil compartment and is always sealed, by first introducing water into the bottom of this compartment before the filter is put in operation. A gauge glass is provided on this compartment which should always show about 2" of water. The water descending from the oil is forced upward through the overflow by the weight of the oil above it. The top of the overflow is adjustable so that the rate of flow may coincide with the amount of water coming from the dirty oil.

The Wayne Filter Unit

Filter Units:

The oil, after leaving the precipitation chamber,

passes to the filter unit header, on which are mounted two or more cloth filter units which remove the slime and unprecipitated impurities. These units are built in two sizes known as the large and small size—the large containing 44 square feet and the small 22 square feet of finely and evenly woven cotton filter cloth.

This filter cloth is made up in the form of a tube 4½" in diameter at one end and 15" at the other. The small end of the tube is securely banded to the center post of the container basket and held in vertical sections by a series of cylinders made of galvanized wire screen, each cylinder being larger than the preceding one, the cloth tube being of increasing diameter. It is held free from folds so that every square inch of cloth is utilized as a filtering surface. The large end of the cloth tube is banded to the inside of the shell of the container basket. The container basket has a solid head which is fitted over a felt gasket and held on by screws. It is provided with a handle for convenience in removing.

The oil rises through the center tube of this basket when it is in place on the header post, and passes downward through the cloth. All dirt taken from the oil in this unit is retained in the cloth until it is removed for cleaning.

Both the filter post and the basket are provided with valves the stems of which engage when the unit is in place, allowing a free passage of oil to the unit. These valves automatically close when the section is removed for cleaning.

The entire unit is placed in an open top receptacle which allows it to be immersed in oil, thereby maintaining a constant head over its whole surface.

We wish to call particular attention to the fact that the Wayne Filter Unit has a large area of cloth under a low constant head which is free from folds and in which the dirt taken from the oil is self-contained. Each filter unit is provided with a separate angle valve on the front of the filter cabinet so that if the flow of oil is slow, one or more sections may be held in reserve.

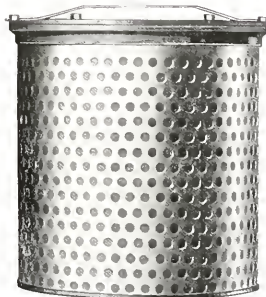
Wayne Filter Unit Parts



Supporting Cylinders



Basket



Unit Complete

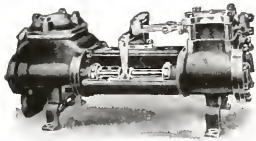


Method of Binding Cloth



Cover Removed

Wayne Filters Are Easy to Clean



PUMP

A duplex steam pump is standard and is furnished with each system. This pump is used to transfer the oil from the clean oil compartment of the filter to the gravity tank.

THE SYSTEM

The Wayne Type C Filtration System is a complete system so that the purchaser need only provide pipe and fittings to connect the units to each other according to their location. The units of the system themselves are provided with all necessary valves, gauges and flanges.

This system is not elaborate in design, the principal thought being simplicity as well as effectiveness. Its finish, however, is of the best to make it in keeping with present-day engine rooms. Polished nickel fittings are used and all tank work is given two coats of enamel and one coat of color varnish.

ACCESSORIES

Steam Coil:

We will furnish, at an added price, a steam coil for the gravity tank when it is located in a cold place so that heat is necessary.

Electric Coils:

We will furnish, at an added price, electric heating coils for the gravity tank or the filter when steam is not obtainable.

Electric Pumps:

We will furnish, at an added price, electric pumps for the transferring of the oil from the clean oil compartment to the gravity tank when it is so desired.



CLEANING

The man who operates a filter is interested almost as much in the time and labor it takes to clean a filter as he is in the work it does. It is at no time necessary to draw the oil from any compartment of the Wayne Type C Filter to outside containers for the purpose of cleaning. The precipitation trays are cleaned in place, one at a time, with a hose and water. Each tray is removed **only after it is cleaned** to expose the next tray. All the dirt on the trays passes to the bottom of the dirty oil compartment, where a suitable valve is provided to run it to the sewer.

The cloth filter units are removable from the filter post and contain only the dirt and slime they have taken from the oil. The two bands binding the cloth to the basket are removed and as the cloth is rolled up, it is turned inside out so that the dirt is on the exposed surface and is readily removed by washing the cloth tube in a pail of gasoline or naphtha. One extra filter cloth is provided for each unit so that the unit may be immediately replaced in service.



Wayne Filters Are Easy to Clean

DATA REQUIRED FOR ESTIMATE
ON
WAYNE OIL FILTRATION AND CIRCULATION SYSTEMS
TO SERVE RECIPROCATING ENGINES

1. Name and Make of each Engine or Machine.....
2. Types of Engines (Simple, Double, Tandem, or Compound).....
3. Horse Power Rating of each Engine.....
4. State whether Steam, Oil, Natural Gas, or Producer Gas Engines.....
5. Diam. of Cylinders (High and Low Pressure).....
6. Length of Stroke.....
7. Revolutions per Minute.....
8. Steam Pressure.....
9. Steam temperature.....
10. Dia. and Length of Main Bearing.....
11. Condensing or Non-condensing.....
12. Belted or Direct Connected.....
13. Number of Oil Cups or Points of Lubrication System will supply.....
14. Size of oil cup taps on Bearings.....
15. Are Engines provided with Oil Guards.....
16. Gallons of Oil per Hour fed to each Engine.....

TO SERVE STEAM TURBINES

1. Name and Make of Turbines.....
2. Number of each to be served.....
3. Type (Horizontal or Vertical).....
4. Rated Capacity (Kilo-watt) of each.....
5. Amount of Oil contained in each Machine Reservoir.....
6. Amount of Oil circulated per minute in each machine.....
7. Pressure at which the Oil must circulate.....
8. If Vertical Type of Turbine, give the temperature at which the oil will leave the Machine.....
9. If Vertical Type of Turbine, give the temperature at which the oil will enter the Machine.....
10. If Horizontal Type of Turbine, how long is the Machine run before the oil is changed.....
11. Distance from Lowest Drain to Bottom of Pit or Basement where oil will be collected.....

**DATA REQUIRED FOR ESTIMATE
ON
WAYNE OIL FILTRATION AND CIRCULATION SYSTEMS
(Continued)**

TO SERVE ROLLING MILLS

1. Name and Make of Mill
2. Steam or Electric Drive
3. Number and Size of Bearings to be Lubricated
4. Type of Bearings (Ball and Socket, Spindle, Rigid Pedestal, Tee)
5. Number and Size of Taps for Oil Cups on each Bearing
6. What Bearings are Water Cooled?

GENERAL INFORMATION REQUIRED

1. Must Filter be located in Basement, Pit or on Engine Room Floor
2. What Space will be available for the Gravity Tank and give height the tank can be placed above the Engine Room Floor...
3. Distance from center of Drip Main to Basement Floor
4. Greatest Depth below the Engine Room Floor that can be drained to sewer
5. Will Steam or Electric Power be available for oil pumps
6. If Electric Power, state kind of current available, A.C. or D.C.; if A.C. current, give voltage, phase and cycle; if D.C., give voltage
7. If Filter is to serve Large Electric Motor Bearings, give Make and Capacity of Motor and Size of Bearings
8. Will Live Steam, Exhaust Steam, Hot Water or Electricity be available for Heat in the Filter or Gravity Tank
9. Will Heat be necessary in the Gravity Tank...
10. How much Oil is purchased each month for Journal Lubrication
11. What Brand of Oil is now being used
12. Will additional Oil Storage be required; if so, how much?
13. What will be the general finish of cups and fittings? Nickerled or polished brass?

Dimensions, Capacities and Shipping Weights Type C System

	Size No.	1	2	3	4
Filter Cabinet.....	Height	42"	48"	60"	60"
	Width	30"	42"	42"	60"
	Front to Back	30"	30"	36"	42"
	Filter Units	2 small	3 small	2 large	3 large
	Sq. Ft. of Cloth	44	66	88	132
	Sq. Ft. of Precipitation.....	20	36	45	60
	Dirty Oil Capacity.....	38 gal.	55 gal.	100 gal.	145 gal.
	Clean Oil Capacity.....	80 gal.	120 gal.	160 gal.	240 gal.
	Shipping Weight	600 lbs	900 lbs.	1200 lbs.	1500 lbs.
Gravity Tank.....	Height	30"	30"	30"	34"
	Front to Back	20"	28"	34"	38"
	Length	42"	58"	95"	114"
	Capacity	100 gal.	200 gal.	400 gal.	600 gal.
	Shipping Weight	275 lbs.	360 lbs.	600 lbs.	785 lbs.
Steam Pump.....	Sizes	3x2x3	3x2x3	3x2x3	3x2x3
	Shipping Weight	125 lbs.	125 lbs.	125 lbs.	125 lbs.

REG. U. S.
Wayne
TRADE MARK

Type B Cutting Oil Filter

BULLETIN No. 6000



Patents Pending

Type B Filter, Size No. 1
Wayne Filters Are Easy to Clean.

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating

Cutting Oil Filtration

Up to date machine shops are constantly striving to increase individual machine production. The placing on the market of the Wayne Type B Cutting Oil Filter provides a new way in which to increase the production of machine tools using cutting oil.

The cutting oil as it flows from the centrifugal chip separator or scrap baler is loaded with fine metal particles. That which remains in the machine tools is also filled with dirt, scale, and metal.

The filtration of this cutting oil is a practice that has been strongly recommended by writers in trade journals, but it has remained for the Wayne Oil Tank & Pump Co. to design a filter that is made to handle cutting oil. The Wayne Type B Filter is a cutting oil filter and not a makeshift or some other type of filter offered to meet a demand or fill an inquiry.

It is a batch filter: that is, one taking dirty oil at intervals instead of continuously, which experience has taught us is best suited to the needs of the average machine shop.

By the installation of the proper size Wayne Type B Cutting Oil Filter, which will clean all the oil recovered from the chip separators or balers before it goes back into use, and in addition will provide a means for the periodically cleaning of the machines themselves, the following results will be secured:

TOOLS WILL STAY SHARP LONGER.

THERE WILL BE LESS LABOR IN CHANGING AND SHARPENING TOOLS.

BETTER FINISH ON THE WORK.

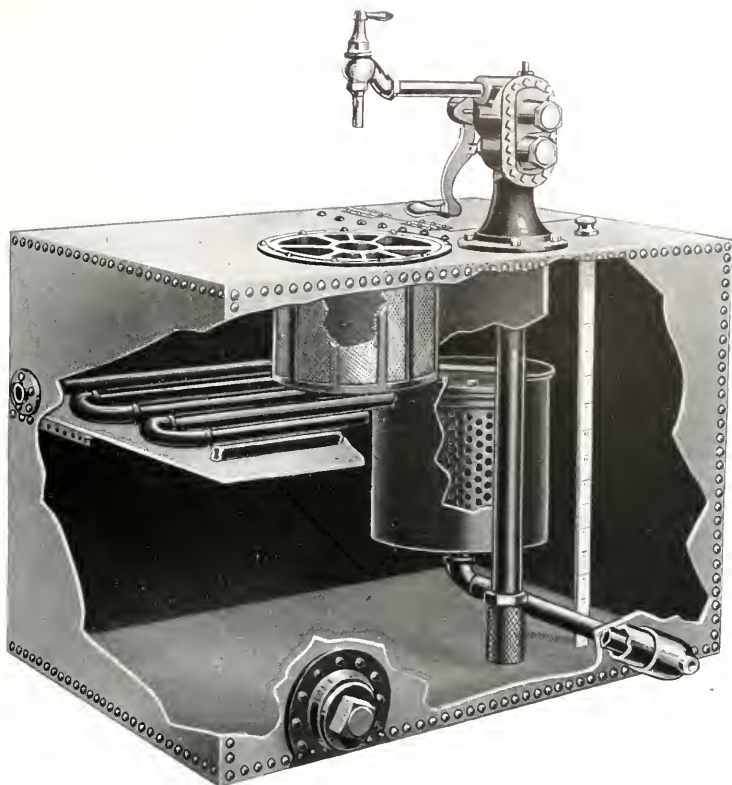
THE OIL WILL COOL BETTER.

THERE WILL BE LESS GUMMING OF THE OIL.

THE LIFE OF THE MACHINE TOOLS WILL BE LENGTHENED.

We have found that when only filtered or new oil is added to that in the pans of the machines and in addition all the oil is withdrawn periodically from the pans and filtered, the oil in daily circulation will secure the above results and also reduce to a minimum the skin infection, sometimes prevalent among screw machine operators.

Some automatic screw machines have a live spindle in the head that is lubricated with cutting oil from the pan of the machine. If the cutting oil in these machines is not kept clean the life of the machines will be shortened and the amount of power required to operate the live spindle will be increased.



Sectional View Type B Filter, No. 1 Size
Wayne Filters Are Easy to Clean.

Description

The Wayne Type B Filter is built in four sizes—depending on the batch of dirty oil to be handled at one time.

Its operation is to screen, heat, precipitate and strain. The batch of dirty oil enters the precipitation compartment of the filter through a screen pail suspended in the top of this compartment. This screen pail is substantially made of brass wire screen that removes all the coarse impurities from the oil.

The oil, after entering the precipitation compartment, is heated by means of a steam coil in the bottom of the compartment. The heating aids precipitation by thinning the oil and allowing all the heavier than oil impurities to settle to the bottom of the compartment.

When the oil is thoroughly heated the steam is shut off and the oil is allowed to stand at perfect rest for at least an hour. The thinned oil standing at absolute rest for a period of time, will clean

itself of all impurities, except those having a gravity at, or near, that of the oil itself. After the oil has been thinned by heat, the heat shut off and the impurities allowed to precipitate to the bottom of the compartment, the oil is drawn from a point several inches above the bottom of the precipitation chamber and allowed to run by gravity to a cloth filter unit. The oil raises through this filter unit and out through the fine cloth into the clean oil compartment of the filter.

A polished nickel sampling valve is provided at the draw-off level of the precipitation compartment so that the condition of the oil may be ascertained before it is passed through the cloth filter unit.

The line from the draw-off level of the precipitation compartment to the cloth filter unit is steam jacketed, a special Wayne feature.

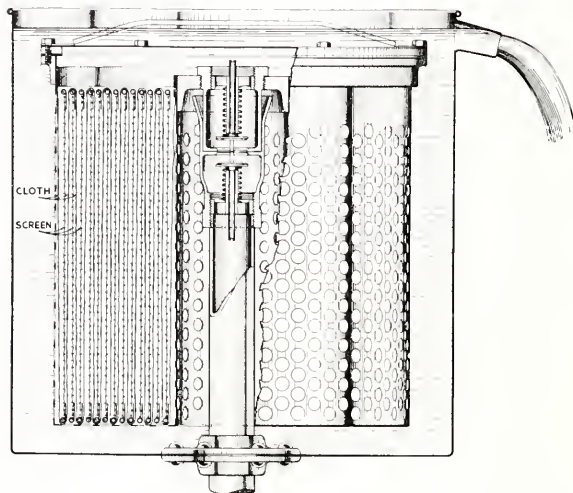
The advantage in this is that it will allow a heavy cutting oil, which may contain a considerable amount of lard oil, to pass through the filter cloth

without forming a coating on the cloth which will shut off the flow of oil.

If we were to reheat the oil in the precipitation compartment by means of the steam coil in the bottom of this compartment the heat would agitate the precipitate which had settled to the bottom. It would be thrown up into the settled oil so that it would pass off to the filter cloth.

This would result in more dirt for the cloth unit to take out and necessitate more frequent cleaning of the cloth.

By heating the settled oil after it leaves the precipitation compartment and before it reaches the cloth filter unit we have gained an ideal condition which results in clean oil with a minimum of cleaning of the filter cloth.



The Wayne Cloth Filter Unit
Wayne Filters Are Easy to Clean.

The Wayne Cloth Filter Unit

The oil, after leaving the precipitation compartment and being heated in its steam jacketed passage, flows through the cloth filter unit which removes the last of its impurities.

The cloth filter unit is a special Wayne design and is used in all of the larger types of Wayne filters. It is built in two sizes, the larger containing 44 square feet of closely woven cloth and the smaller 22 square feet.

This filter cloth is made up in the form of a tube 4 inches in diameter at one end and 13 inches at the other. The small end of the tube is securely banded to the center post of the container basket and held in vertical sections by a series of cylinders made of galvanized wire screen, each cylinder being larger than the preceding one, the cloth tube being of increasing diameter. It is held free from folds so that every square inch of cloth is utilized as a filtering surface. The large end of the cloth tube is banded to the inside of the shell of the container basket. The container basket has a solid head

which is fitted over a felt gasket and held on by screws. It is provided with a handle for convenience in removing.

The oil rises through the center tube of the basket when it is in place on the header post, and passes downward through the cloth. All dirt taken from the oil in this unit is retained in the cloth until it is removed for cleaning.

Both the filter post and the basket are provided with valves, the stems of which engage when the unit is in place, allowing a free passage of oil to the unit. These valves automatically close when the section is removed for cleaning.

The entire unit is placed in an open top receptacle which allows it to be immersed in oil, thereby maintaining a constant head over its whole surface.

We wish to call particular attention to the fact that the Wayne Filter Unit has a large area of cloth under a low constant head which is free from folds and in which the dirt taken from the oil is self-contained.

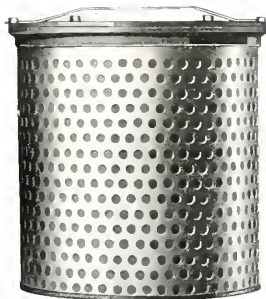
Wayne Filter Unit Parts



Supporting Cylinders



Basket



Unit Complete



Method of Binding Cloth



Cover Removed

Wayne Filters Are Easy to Clean.

Pumps

A hand rotary pump is mounted on the clean oil compartment of the Type B-1 and is standard without extra charge. In sizes 2, 3 and 4 a suction flange only is provided and either a hand or power pump will be supplied as an accessory at an added price.

Construction and Finish

The Wayne Type B Filter is built of galvanized steel sheets with all seams spot welded or riveted and flushed with solder. It is dustproof and fire-proof. Fourteen gauge sheets are used in the No. 1 size and twelve gauge in the larger sizes. All exterior fittings are of polished nickel. The filter is finished in green and black enamel, being given two coats of enamel and one coat of varnish.

Summary

The Type B cutting oil filter should be installed in all machine shops using cutting oil. It will increase machine production and cut operating and maintenance costs.

WHY NOT USE CLEAN CUTTING OIL ALL THE TIME? CUTTING OIL WHEN NEW IS EXPENSIVE. THIS EXPENDITURE IS NOT JUSTIFIED IF YOU RETURN DIRTY CUTTING OIL TO THE MACHINES FROM THE CHIP SEPARATORS.

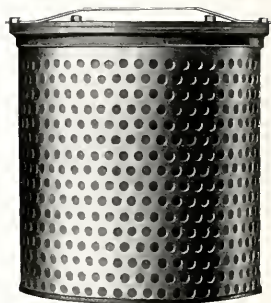
Cleaning

The man who operates a filter is interested as much in the time and labor it takes to clean the filter as he is in the work it does.

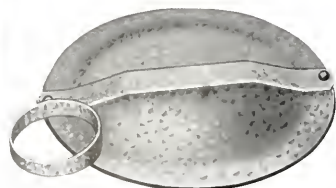
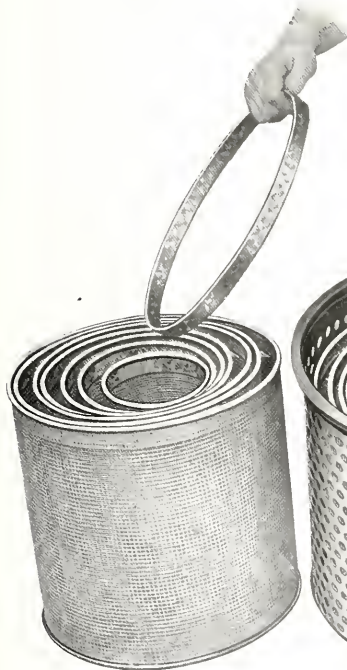
The screen pail through which the oil first enters the filter is easily removed through a manhole provided for that purpose.

The precipitation compartment is provided with a clean-out flange and is easily cleaned by means of a steam or hot water hose which will wash all the precipitate to the sewer.

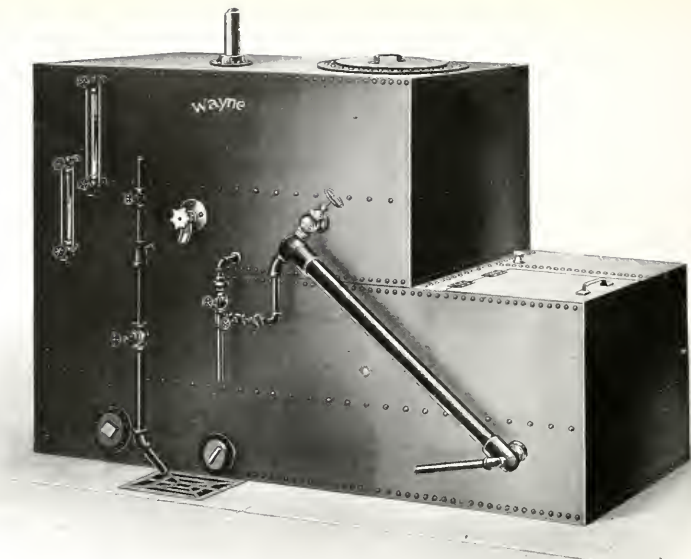
The cloth filter units are removable from the filter post and contain only the dirt and slime they have taken from the oil. The two bands binding the cloth to the basket are removed and as the cloth is rolled up, it is turned inside out so that the dirt is readily removed by washing the cloth tube in a pail of gasoline or naphtha. One extra filter cloth is provided for each unit so that the unit may be immediately replaced in service.



Wayne Filters Are Easy to Clean.

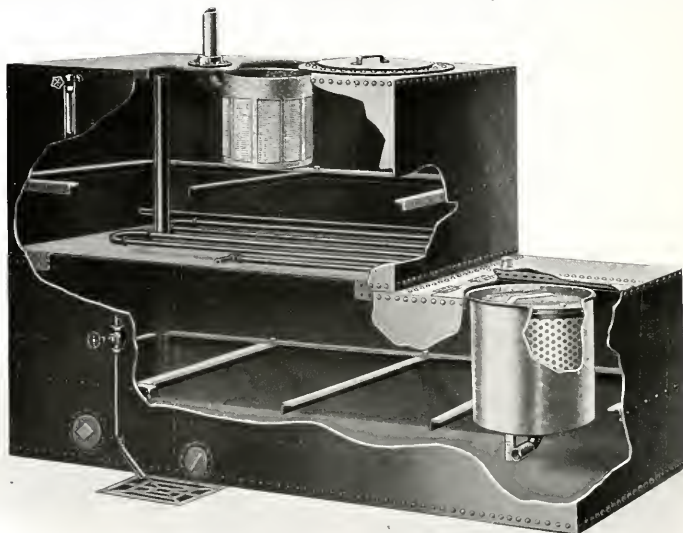


Wayne Filters Are Easy to Clean.



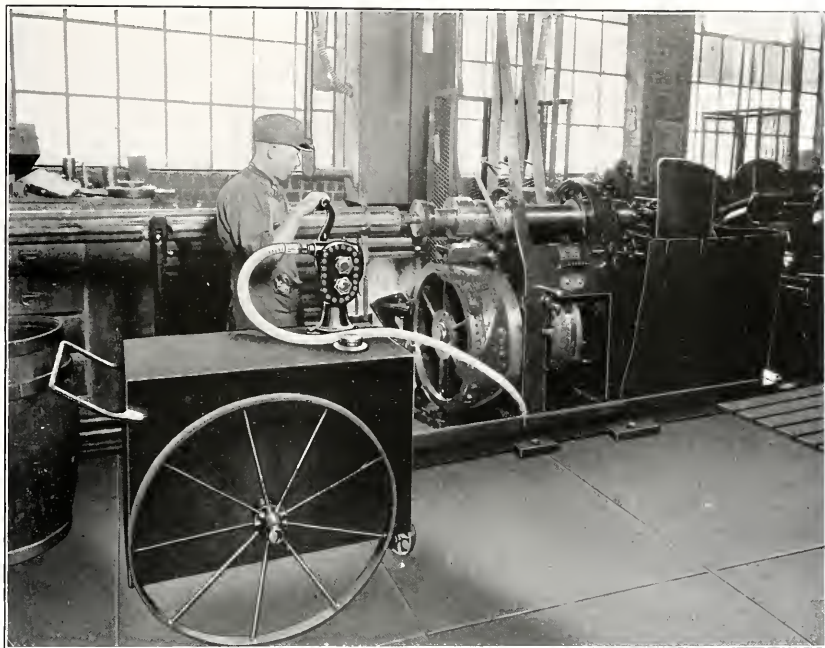
Type B Filter, Size No. 3
Wayne Filters Are Easy to Clean.

The above illustration shows the Wayne Type B Filter in the number 3 size. This filter is identical with the number 1 size illustrated on the cover of this bulletin except that the precipitation compartment is located on top of the clean oil compartment instead of within it. In the number 3 size we use a large cloth filter unit with 44 square feet of filter cloth.



Sectional View Type B Filter, No. 3 Size
Wayne Filters Are Easy to Clean.

The sectional view of the number 3 size shows the screen pail, ample heating coil and location of the cloth filter unit. Please note the tank construction showing angle iron bracing. All Wayne Filters are built to Wayne standard of construction for years of service.



Cut 227 Wheel Tank

The Wayne Cut 227 Wheel Tank is shown in service withdrawing cutting oil from the pan of an automatic screw machine. This outfit is wheeled to the filter and its contents discharged with the same pump used to fill it. By the use of this outfit the machines can be cleaned at frequent intervals, the oil filtered and returned to the machines. We recommend the use of two of these outfits, one for dirty and one for clean or filtered oil.

Accessories

HAND PUMPS—Our Cut 132 hand rotary pump is standard on the Type B-1 Filter and can be furnished at an added price mounted on the clean oil compartment of the larger sizes.

POWER PUMPS—We can furnish our Cut 4010 power pump when desired to pump the filtered cutting oil to distant points.

REMOTE CONTROL VALVE—We can furnish our Cut 386 remote control valve for controlling the power pump if the filtered oil is to be pumped to a distant point.

WHEEL TANKS—We can furnish our Cut 227 wheel tank with rotary pump. This outfit holds 65 gallons of oil and is built in one or two compartments with one or two pumps. It is a convenience and a labor saving device in transferring oil from the filter to the machine tools and in cleaning out the pans of the machines.

ELECTRIC HEATERS—We can equip our filters with electric heating units when steam is not available.

Data Required

1. Gallons of Cutting Oil per day returned from Chip Separators.
2. Number of hours per day chip separators are operated.
3. Number of machine tools using cutting oil.
4. Total gallons of oil contained in pans of above machine tools.
5. Number of hours per day machines are in operation.
6. Gallons of oil per day returned from scrap balers.
7. Gallons per day of new cutting oil used.
8. Kind of cutting oil used.
9. Give analysis if possible.
10. What per cent of lard oil does cutting oil contain?
11. What steam pressure will be available at the filter?
12. If electric heat must be used state voltages, phase and cycle of current.
13. If electric pumps are to be used state voltage, phase and cycle of current.
14. If electric pumps are to be used give verticle and horizontal distance in feet from filter to point of discharge.

Dimensions, Capacities and Shipping Weights---Type B Cutting Oil Filters

Size No.	1	2	3	4
Length	41"	57"	87"	103"
Height	29½"	59"	59"	59"
Width front to back	28"	34"	34"	42"
Capacity dirty oil above drawoff	28½ gal.	100 gal.	200 gal.	300 gal.
Total capacity dirty oil	35 gal.	130 gal.	250 gal.	380 gal.
Capacity clean oil	75 gal.	200 gal.	318 gal.	450 gal.
Heating surface of steam coil	2.3 ft.	3.5 ft.	6.4 ft.	9.5 ft.
Filter unit	1 small	1 large	1 large	1 large
Square feet of cloth	22	44	44	44
Square inches of precipitation surface	665	1225	2240	3450
Shipping weight	400 lbs.	500 lbs.	900 lbs.	1300 lbs.



Type H Portable Batch Filter

BULLETIN No. 6500



Type H Filter
Wayne Filters are easy to clean

Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

Wayne Type H Filter

The Wayne Type H Filter is a portable small batch filter designed to possess the same principles of WATER SEPARATION, PRECIPITATION AND STRAINING that are embodied in our large oil filters. It is built to fill the demand for a good filter to clean present high priced lubricating oils in small quantities. Lubricating oil does not wear out and should be filtered and used over again.

Suggested Uses For Type H Filters

In small power plants where the quantity of oil used does not justify a circulating system.

In large power plants for auxiliary equipment.

In machine shops where oil is drawn from planer beds, milling machines, vertical turret lathes, and other machine tools having a self-contained lubricating system.

For filtering oil from ring oiled bearings.

For garages, to take the abrasive foreign particles from crank case oil.

For oil used in testing machine tools before shipping.

In railway oil cars.

For all oil rooms.

To Thoroughly Clean Dirty Oil Attention Must Be Paid To:

Water Separation

Heat is necessary to secure complete water separation. The Wayne Type H Filter is equipped with a copper steam coil, or electric heating unit, of sufficient capacity to quickly raise the temperature of the oil to 180 degrees Fahrenheit.

A water settling space is provided at the bottom of the dirty oil compartment to which is connected an automatic water overflow column. By the use of this automatic water overflow, no accumulated water remains in the filter. The water level never becomes so high that the circulating oil has to force itself through the water. This water level remains constant without any attention whatever from the operator, thereby eliminating a common fault of most small filters.

All Wayne Filters are built on the axiom that oil cannot be washed with water. Water is an impurity to be removed just as much as dirt, and the thoroughness of its removal is one of the cardinal points of the Wayne Type H Filter.

Precipitation

Perfect precipitation requires time. Precipitation will remove fine impurities from oil that cannot be removed by any straining media. In the

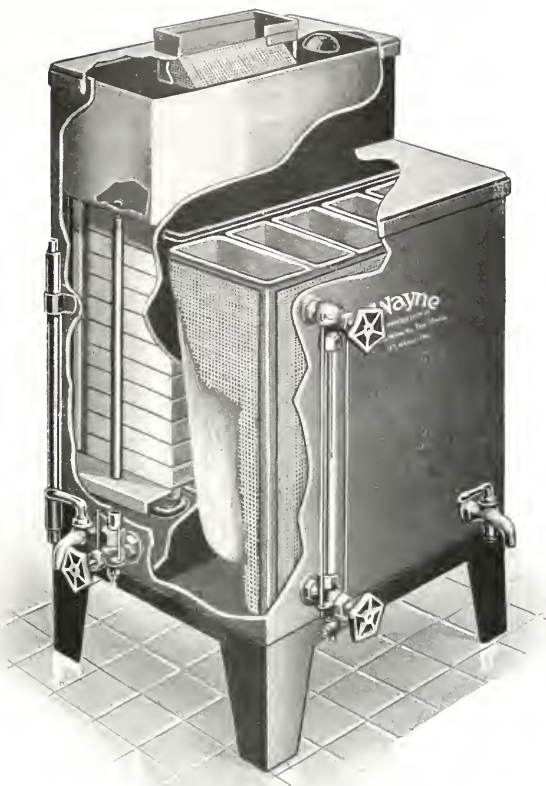
Wayne Type H Filter the flow of oil is held back mechanically in the Receiving Chamber so that only a given amount of oil can pass through the precipitation chamber in a given time. The oil is thinned in the heating compartment to aid precipitation.

The Precipitation Chamber is filled with a number of shallow trays so arranged that each tray receives a small portion of the slowly traveling oil, allowing it to come to almost perfect rest.

Straining

By providing a number of cloth bags of finely woven material, and then holding these bags apart from themselves and from the walls of the filter, we provide a maximum of filtering surface, every square inch of which is equally effective. IT IS IMPOSSIBLE FOR THE BAGS TO MAT TO ONE ANOTHER OR TO THE SIDES OF THE FILTER.

The Wayne Type H Filter must not be confused with cheap hand filters that use coarse or non-uniform straining media, having a high rated capacity but which in fact are little better than coarse screens. The rating of the Type H Filter is based on red engine oil per day and will run over or under, according to whether the oil to be filtered is lighter or heavier.



Cutaway View, Type H Filter

Wayne Filters are easy to clean

Operation

The action of the Wayne Type H Filter is positive and cannot be forced in such a way that the oil will not be thoroughly cleaned. It is so constructed that only the quantity of oil held by the dirty oil receptacle can be poured into the filter at one time.

In most hand filters, the time for precipitation can be reduced to almost nothing by pouring several pails of dirty oil into the filter at one time. This so increases the rate of flow of oil through the filter that the straining cloth must do all the work. Fine impurities will be forced through the cloth into the clean oil and also frequent cleaning of the cloth must be resorted to.

In each size of the Type H Filter the outlet to the dirty oil receptacle is made just large enough

to permit the proper flow of oil through the filter.

The dirty oil enters the filter through the strainer box which removes the coarse impurities. This strainer box is exposed in the lid of the filter so that it is not necessary to remove the entire lid to operate the filter. The oil leaving the dirty oil receptacle passes downward through a tube to the heating compartment where, by its contact with a copper steam coil, its temperature is raised to 180 degrees Fahrenheit. This thins the oil for precipitation and allows the water it may contain to drop to the bottom of the compartment where it is expelled from the filter by means of the automatic water overflow.

From the heating compartment the thin oil passes upward through the distribution header to the precipitation compartment which contains a number of shallow trays arranged in parallel so that each

tray receives an equal portion of the small quantity of dirty heated oil. The broad surface of each tray taking only a small amount of the total oil reduces the velocity of the flow of oil over the trays so that it approaches almost perfect rest. Repeated tests have shown that approximately 85% of the impurities in the oil are left on the trays. An outlet is provided from the bottom of each tray direct to the water level in the heating compartment so that water deposited on the trays may be carried off.

After the semi-purified oil has passed over the trays, it is carried by means of a brass header pipe to a number of cloth filter bags suspended in the top of the clean oil compartment. The brass header pipe extends at one end to outside the filter and is provided with a removable cap so that it may be readily cleaned. The filter bags are made of a fine even texture cotton cloth which is the same as is used in the Wayne Type C Circulating Filter. By using a number of bags instead of one we are able to double the area of cloth in this filter. Each bag is held apart from the walls of the filter and from the other bags by means of a galvanized wire screen, thereby preventing the bags from becoming matted to the tank or to each other with a resultant reduction of filtering area. This is an exclusive Wayne feature.

All of the oil must pass through some part of the area of these cloth bags before it can be drawn off as clean oil. The filter is provided with a draw-off valve on the clean oil compartment. Two glass gauges are provided to show the contents of the clean and dirty oil compartments, respectively.

Cleaning

We claim for the Wayne Type H Filter that it is the most satisfactory to clean of any on the market. No matter how good may be the quality of the oil a filter will turn out, the filter is undesirable if it takes a considerable amount of time or labor to clean it, or if it makes a sloppy mess when being cleaned.

Precipitation Tray

The precipitation trays can be cleaned in place, one at a time, with water, removing each tray only after it is cleaned to expose the next. If desired, all the trays may be removed for cleaning. The cloth filter bags are removed through the lid of the



Type H Precipitation Tray

Note that the trays may be removed one at a time.

clean oil compartment, turned inside out and washed in a pail of gasoline or naphtha. Extra bags are provided with each filter.



Type H Filter Bag

Construction and Finish

The Type H Filter is constructed of heavy gauge galvanized steel with all seams riveted or spot welded and solder flushed.

The filter is finished in two coats of green enamel and one coat of color varnish. All valves, fittings and the automatic water overflow column are polished nickel to harmonize with well kept plants. This filter is, in its construction as in its design, a counterpart of our large filters and not a makeshift to sell at a price.

Type H Filter---Dimensions, Capacities and Shipping Weights

Size	Filtering Capacity, Gallons Per Hour	Maximum Batch, Gallons	Clean Oil Storage, Gallons	Precipitation Surface, Square Feet	Filter Cloth, Square Feet	Number of Filter Bags	Outside Dimensions in Inches			Shipping Weight
							Width	Depth	Height	
1	4-8	3	10	9	9	4	20	16	26	110
2	8-15	5	20	12	13	5	22	18	31	135
3	15-30	7	30	16	20	6	24	22	36½	170

REG. U. S.
Wayne
TRADE MARK

Type CA Circulating Oil Filtration System

BULLETIN No. 7000



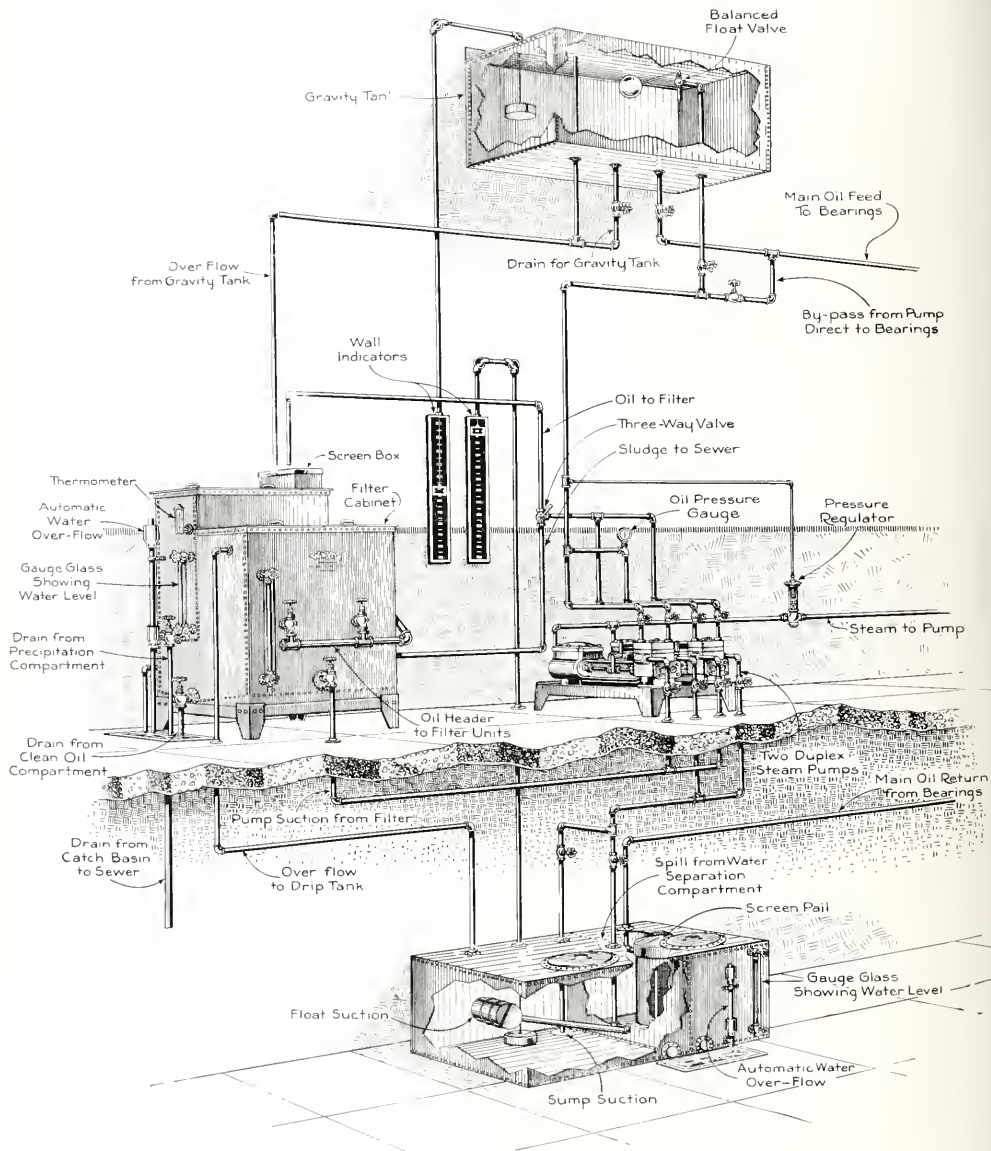
Filter Cabinet
Wayne Filters Are Easy to Clean

Wayne Oil Tank & Pump Company

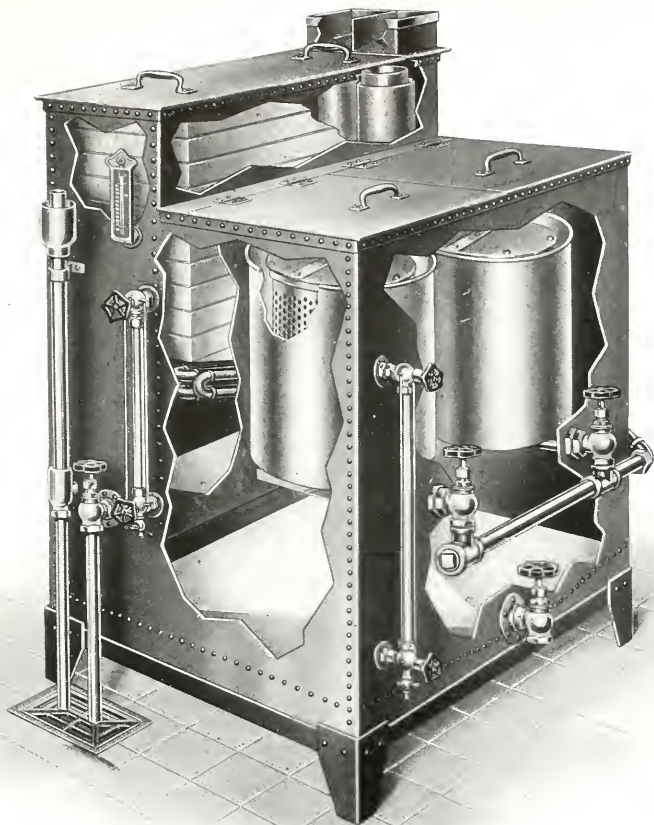
Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Oil Filtration Systems—Oil Burning Systems
Furnaces for Metal Melting, Forging and Heat Treating



General Arrangement of Type CA Circulating System
Wayne Filters Are Easy to Clean.



Wayne Filters Are Easy to Clean.

Wayne Type CA Oil Filtering and Circulating System

INTRODUCTION

The Wayne Type CA System has been designed to meet all the conditions where a continuous flow of clean, pure oil is required. The science of lubrication has developed to such a point that no power plant can afford to use the old fashioned method of hand oiling. The high cost of poor lubrication, coupled with the enormous annual loss due to wasteful methods of handling and using of oils, is making the power user realize that it is time to apply efficiency to his oiling system. He is using scientific means for the selection of the proper grade of lubricant especially adapted to his particular engine requirements and he is demanding that his high grade oil be conserved, reclaimed and used over and over.

The Type CA System is adapted for use with Re-

ciprocating Steam Engines, Gas Engines, Diesel Engines, Electric Motor Drives and Turbines where a partial or complete circulation of oil is desired.

The two most important elements in a continuous circulating filter are the elimination of dirt and water, and the ease of cleaning the filter. These elements were constantly before our engineers during the designing of this filter. Operating experience has shown that the Wayne Type CA Filter will absolutely eliminate dirt and water under the worst possible conditions and can be cleaned with a minimum of both trouble and frequency. Provision is made for taking the accumulated dirt and slime from the filter without removing the oil. We wish to call particular attention to the section of this bulletin headed "Cleaning".

OPERATION

The Type CA System is composed of three units, the filter cabinet, gravity tank and the drip tank. When this system is used the drip tank only is placed below the level of the bearings to receive the oil by gravity. The filter cabinet is placed on the engine room floor. If it is desired to place the filter cabinet below the level of the bearings the Type C System composed of filter cabinet and gravity tank should be used.

From the gravity tank, which is located well above the bearings to be lubricated, the oil flows to the bearings in a sufficient quantity to provide a stream of pure, clean oil on every bearing. From the oil guards, or reservoirs, below the bearings, the oil is collected by means of drip mains and carried by gravity to the drip tank. In the drip tank the coarse impurities are screened out and the free water is separated from the oil. The oil is pumped to the filter cabinet from the drip tank by means of a duplex steam pump on which the oil end is divided into two suction and two discharges. A cylinder full of clean oil is taken from the clean oil compartment of the filter cabinet and discharged to the gravity tank at the same time a cylinder full of dirty oil is taken from the drip tank and discharged to the filter cabinet.

DESCRIPTION IN DETAIL

Gravity Tank:

A Gravity Tank is provided of sufficient capacity to hold a two hours' supply of oil to all bearings. This tank is made of galvanized steel and constructed with absolutely leak-tight seams. The large size tanks are suitably reinforced with stays and stiffeners.

The Gravity Tank is fitted with a 15" manhole with steel cover and lock. There will be the necessary flanges for fill, draw-off, overflow and float gauge. Also two steam coil flanges will be provided and plugged unless a steam coil is necessary, in which case it is an accessory.

All flanges are made of malleable iron, riveted to the tank and flushed with solder.

An overflow fitting is provided inside the tank from the overflow flange to carry surplus oil back to the clean oil compartment of the filter.

Float Gauge:

The Gravity Tank is equipped with our Cut 332 storage indicator, showing at all times the contents of oil.

Filter Cabinet:

The oil pumped from the drip tank enters the filter cabinet through a heavy brass wire screen, passes to the heating compartment, thence through the precipitating chamber and from there to the filter units, and from these units to the clean oil compartment.

Brass Screen:

A brass screen is provided where the dirty oil enters the filter to take out the coarse impurities. It is so constructed that if it becomes clogged with impurities, the oil will overflow into the filter and not onto the floor.

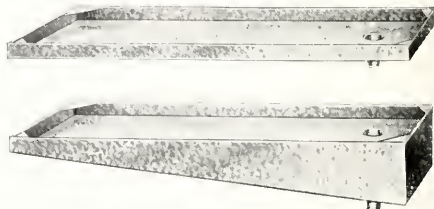
Heating Compartment:

The oil leaving the screen passes downward and thence latterly over the heating coils, which are provided in sufficient capacity to raise the temperature of the oil to 180 degrees Fahrenheit. This reduces its viscosity, or thins it, placing it in a condition to release the entrained water that it may have gathered from the engine or bearing and to allow the fine impurities to precipitate.

Precipitation Chamber:

The oil runs from the heating compartment to a point opposite one end only of the precipitation trays. A maximum amount of precipitation is provided, thereby eliminating frequent cleaning of the cloth filter units. Precipitation and rest are in direct proportion to each other and great care is given this feature of the Wayne Type CA Filter. The proper proportion of heating surface and of precipitation surface is maintained throughout the different sizes of this filter, as well as the ratio of precipitation surface to cloth straining surface.

The precipitation chamber is completely filled with shallow trays arranged in multiple to give the greatest area and, therefore, the longest period of time for a given volume of oil. These trays are placed directly over the steam coil and are insulated from it by an air chamber so that the precipitation in the trays is not being continually agitated by direct heat. The space between each tray is about 1/32" and only a given fraction of the total volume of oil passes through this space and latterly over a given tray.

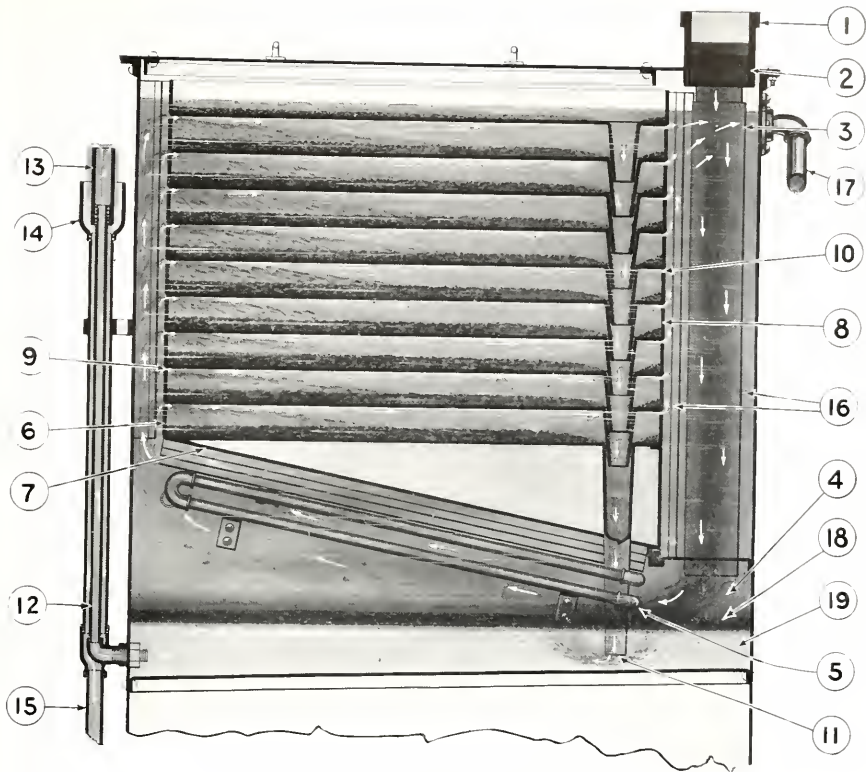


Precipitation Trays

Note that lower tray is provided with an air space for insulation from heating coil.

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The oil passes lengthwise of the trays so slowly that approximately 85% of its impurities are deposited on the trays. This method of splitting the volume of oil into equal parts and passing each part



Sectional View of Precipitation Compartment.

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(1) Screen Box, (2) Brass Screen, (3) Conductor to heating chamber, (4) Heating Chamber, (5) Heating Coil, (6) Lower Tray with (7) Insulated Bottom, (8) Precipitation Trays, (9) Space between trays for entrance of oil, (10) Space for exit of oil, (11) Water spout from trays, (12) Automatic Water Overflow, (13) Adjustable Water Spill, (14) Spill Cup, (15) Water line to sewer, (16) Collection Header, (17) Connection to Cloth Filter Units, (18) Sludge, (19) Settled Water.

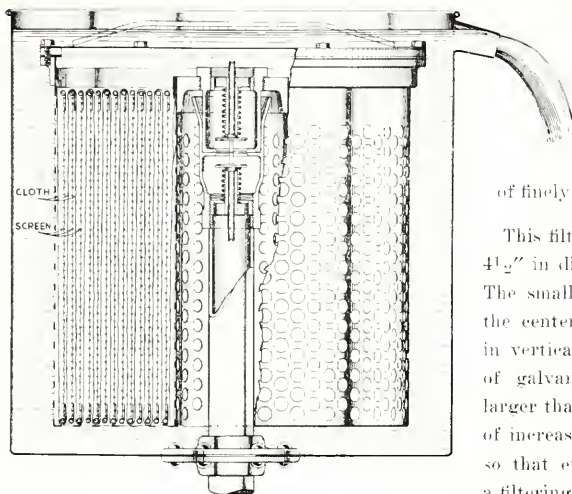
slowly over a precipitation tray is an exclusive Wayne feature.

Water:

The free water coming from the drip mains with the oil is removed in the drip tank. The entrained water in the oil is freed from the oil as it passes over the steam coils and settles to the bottom of the dirty oil compartment. Any emulsion that may get into the trays in the precipitation compartment is allowed to descend to the water level by means of a tube from each tray.

Automatic Water Overflow:

The automatic water overflow is connected by a flange to the bottom of the dirty oil compartment and is always sealed, by first introducing water into the bottom of this compartment before the filter is put in operation. A gauge glass is provided on this compartment which should always show about 2" of water. The water descending from the oil is forced upward through the overflow by the weight of the oil above it. The top of the overflow is adjustable so that the rate of flow may coincide with the amount of water coming from the dirty oil.



The Wayne Filter Unit
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DRIP TANK

In the CA System a drip tank is so located that it first receives the oil from the bearings before it is pumped to the filter cabinet. The drip tank is an advantage where there is not sufficient space below the level of the bearings to place the filter cabinet as is contemplated in the Type C System. The oil enters the drip tank through a screen pail which removes the coarse impurities. This screen pail is located in a compartment at one end of the tank. At the bottom of this compartment is attached an automatic water overflow column so that free water settling from the oil by gravity may be at once expelled from the system. The oil overflows from this first water separation compartment into the main compartment of the drip tank. From here it is pumped to the filter cabinet. There will be some precipitation of dirt in this compartment and it is therefore provided with a sump suction so that this precipitate may be at intervals discharged to the sewer. In the No. 1 size of the CA System the main suction taking the oil from the drip tank to the filter cabinet is raised a few inches from the bottom of the drip tank so as not to carry the precipitate to the filter cabinet. In the Nos. 2, 3 and 4 systems a float suction is provided which removes the oil only from the surface of that contained in the drip tank.

The Wayne Filter Unit

Filter Units:

The oil after leaving the precipitation chamber,

passes to the filter unit header, on which are mounted two or more cloth filter units which remove the slime and unprecipitated impurities. These units are built in two sizes known as the large and small size—the large containing 44 square feet and the small 22 square feet of finely and evenly woven cotton filter cloth.

This filter cloth is made up in the form of a tube 4½" in diameter at one end and 15" at the other. The small end of the tube is securely banded to the center post of the container basket and held in vertical sections by a series of cylinders made of galvanized wire screen, each cylinder being larger than the preceding one, the cloth tube being of increasing diameter. It is held free from folds so that every square inch of cloth is utilized as a filtering surface. The large end of the cloth tube is banded to the inside of the shell of the container basket. The container basket has a solid head which is fitted over a felt gasket and held on by screws. It is provided with a handle for convenience in removing.

The oil rises through the center tube of this basket when it is in place on the header post, and passes downward through the cloth. All dirt taken from the oil in this unit is retained in the cloth until it is removed for cleaning.

Both the filter post and the basket are provided with valves the stems of which engage when the unit is in place, allowing a free passage of oil to the unit. These valves automatically close when the section is removed for cleaning.

The entire unit is placed in an open top receptacle which allows it to be immersed in oil, thereby maintaining a constant head over its whole surface.

We wish to call particular attention to the fact that the Wayne Filter Unit has a large area of cloth under a low constant head which is free from folds and in which the dirt taken from the oil is self-contained. Each filter unit is provided with a separate angle valve on the front of the filter cabinet so that if the flow of oil is slow, one or more sections may be held in reserve.

Wayne Filter Unit Parts



Supporting Cylinders



Basket



Unit Complete

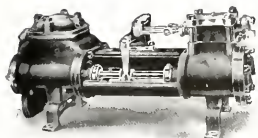


Method of Binding Cloth



Cover Removed

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PUMP

A duplex steam pump is furnished with each Type CA System. The oil end of this pump is divided into two suctions and two discharges so that one pump will take oil from the drip tank and deliver it to the filter cabinet at the same time it is taking clean oil from the filter cabinet and delivering it to the gravity tank.

THE SYSTEM

The Wayne Type CA Filtration System is a complete system so that the purchaser need only provide pipe and fittings to connect the units to each other according to their location. The units of the system themselves are provided with all necessary valves, gauges and flanges.

This system is not elaborate in design, the principal thought being simplicity as well as effectiveness. Its finish, however, is of the best to make it in keeping with present-day engine rooms. Polished nickel fittings are used and all tank work is given two coats of enamel and one coat of color varnish.

ACCESSORIES

Steam Coil:

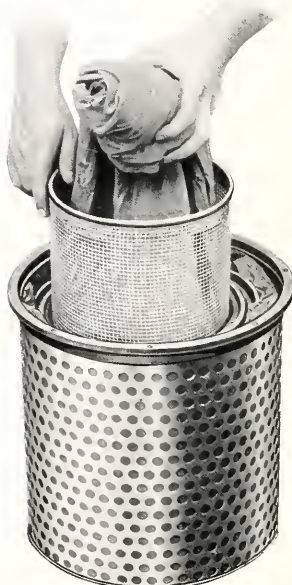
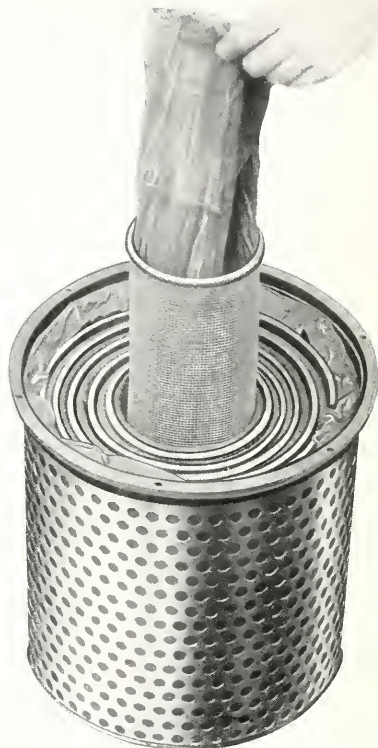
We will furnish, at an added price, a steam coil for the gravity tank when it is located in a cold place so that heat is necessary.

Electric Coils:

We will furnish, at an added price, electric heating coils for the gravity tank or the filter when steam is not obtainable.

Electric Pump:

We will furnish, at an added price, our Cut 4010 motor driven pumps when steam is not available.



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CLEANING

The man who operates a filter is interested almost as much in the time and labor it takes to clean a filter as he is in the work it does. It is at no time necessary to draw the oil from any compartment of the Wayne Type CA Filter to outside containers for the purpose of cleaning. The precipitation trays are cleaned in place, one at a time, with a hose and water. Each tray is removed **only after it is cleaned** to expose the next tray. All the dirt on the trays passes to the bottom of the dirty oil compartment, where a suitable valve is provided to run it to the sewer.

The cloth filter units are removable from the filter post and contain only the dirt and slime they have taken from the oil. The two bands binding the cloth to the basket are removed and as the cloth is rolled up, it is turned inside out so that the dirt is on the exposed surface and is readily removed by washing the cloth tube in a pail of gasoline or naphtha. One extra filter cloth is provided for each unit so that the unit may be immediately replaced in service.



Wayne Filters Are Easy to Clean.

DATA REQUIRED FOR ESTIMATE
ON
WAYNE OIL FILTRATION AND CIRCULATION SYSTEMS
TO SERVE RECIPROCATING ENGINES

1. Name and Make of each Engine or Machine.
2. Types of Engines (Simple, Double, Tandem, or Compound)
3. Horse Power Rating of each Engine
4. State whether Steam, Oil, Natural Gas, or Producer Gas Engines
5. Diam. of Cylinders (High and Low Pressure)
6. Length of Stroke
7. Revolutions per Minute
8. Steam Pressure
9. Steam temperature
10. Dia. and Length of Main Bearing
11. Condensing or Non-condensing
12. Belted or Direct Connected
13. Number of Oil Cups or Points of Lubrication System will supply
14. Size of oil cup taps on Bearings
15. Are Engines provided with Oil Guards
16. Gallons of Oil per Hour fed to each Engine

TO SERVE STEAM TURBINES

1. Name and Make of Turbines
2. Number of each to be served
3. Type (Horizontal or Vertical)
4. Rated Capacity (Kilo-watt) of each.
5. Amount of Oil contained in each Machine Reservoir
6. Amount of Oil circulated per minute in each machine
7. Pressure at which the Oil must circulate
8. If Vertical Type of Turbine, give the temperature at which the oil will leave the Machine.
9. If Vertical Type of Turbine, give the temperature at which the oil will enter the Machine
10. If Horizontal Type of Turbine, how long is the Machine run before the oil is changed
11. Distance from Lowest Drain to Bottom of Pit or Basement where oil will be collected

DATA REQUIRED FOR ESTIMATE
ON
WAYNE OIL FILTRATION AND CIRCULATION SYSTEMS
(Continued)

TO SERVE ROLLING MILLS

1. Name and Make of Mill
2. Steam or Electric Drive
3. Number and Size of Bearings to be Lubricated
4. Type of Bearings (Ball and Socket, Spindle, Rigid Pedestal, Tee)
5. Number and Size of Taps for Oil Cups on each Bearing
6. What Bearings are Water Cooled?

GENERAL INFORMATION REQUIRED

1. Must Filter be located in Basement, Pit or on Engine Room Floor
2. What Space will be available for the Gravity Tank and give height the tank can be placed above the Engine Room Floor
3. Distance from center of Drip Main to Basement Floor
4. Greatest Depth below the Engine Room Floor that can be drained to sewer
5. Will Steam or Electric Power be available for oil pumps
6. If Electric Power, state kind of current available, A.C. or D.C.; if A.C. current, give voltage, phase and cycle; if D.C., give voltage.
7. If Filter is to serve Large Electric Motor Bearings, give Make and Capacity of Motor and Size of Bearings
8. Will Live Steam, Exhaust Steam, Hot Water or Electricity be available for Heat in the Filter or Gravity Tank
9. Will Heat be necessary in the Gravity Tank.
10. How much Oil is purchased each month for Journal Lubrication
11. What Brand of Oil is now being used
12. Will additional Oil Storage be required; if so, how much?
13. What will be the general finish of cups and fittings? Niekled or polished brass?

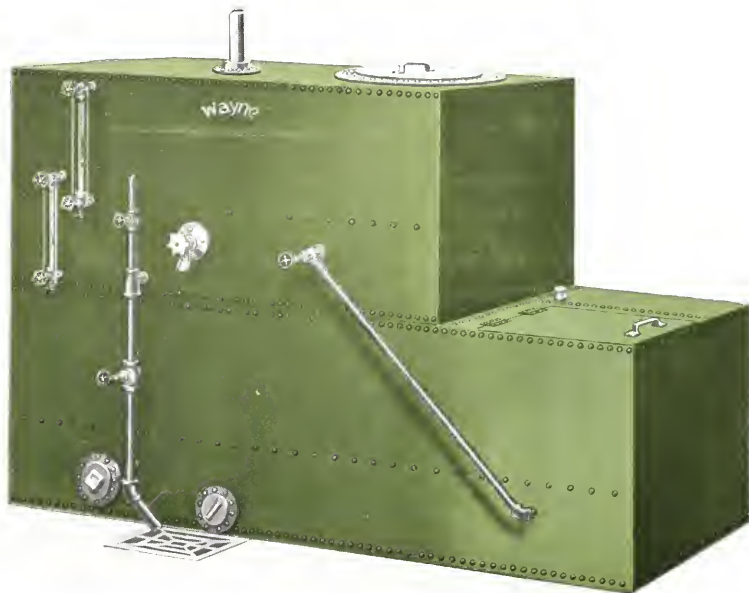
Dimensions, Capacities and Shipping Weights Type CA System

	Size No.	1	2	3	4
Filter Cabinet.....	Height	42"	48"	60"	60"
	Width	30"	42"	42"	60"
	Front to Back	30"	30"	36"	42"
	Filter Units	2 small	3 small	2 large	3 large
	Sq. Ft. of Cloth	44	66	88	132
	Sq. Ft. of Precipitation.....	20	36	45	60
	Dirty Oil Capacity.....	38 gal.	55 gal.	100 gal.	145 gal.
	Clean Oil Capacity.....	80 gal.	120 gal.	160 gal.	240 gal.
	Shipping Weight	600 lbs.	900 lbs.	1200 lbs.	1500 lbs.
Gravity Tank.....	Height	30"	41½"	30"	34"
	Front to Back	20"	20"	34"	38"
	Length	42"	58"	95"	114"
	Capacity	100 gal.	200 gal.	400 gal.	600 gal.
	Shipping Weight	275 lbs.	360 lbs.	600 lbs.	785 lbs.
Drip Tank.....	Height	29½"	29½"	29½"	35½"
	Width	24"	30"	30"	36"
	Length	28"	54"	78"	90"
	Size Drip Flange	1½"	2"	2"	2½"
	Capacity	80 gal.	200 gal.	300 gal.	500 gal.
	Shipping Weight	250 lbs.	560 lbs.	775 lbs.	1025 lbs.
Steam Pump.....	Sizes	3x2x3	3x2x3	3x2x3	3¾x2½x4
	Shipping Weight	125 lbs.	125 lbs.	125 lbs.	175 lbs.

REG. U. S.
Wayne
TRADE MARK

Type T Large Batch Oil Filter

BULLETIN No. 7500



Wayne Oil Tank & Pump Company

Branch Offices in Principal Cities—Salesmen Everywhere

Fort Wayne, Indiana, U. S. A.

Oil and Gasoline Storage Systems—Heavy Metal Storage Tanks—Oil Filtration Systems
Oil Burning Systems—Furnaces for Metal Melting, Forging and Heat Treating

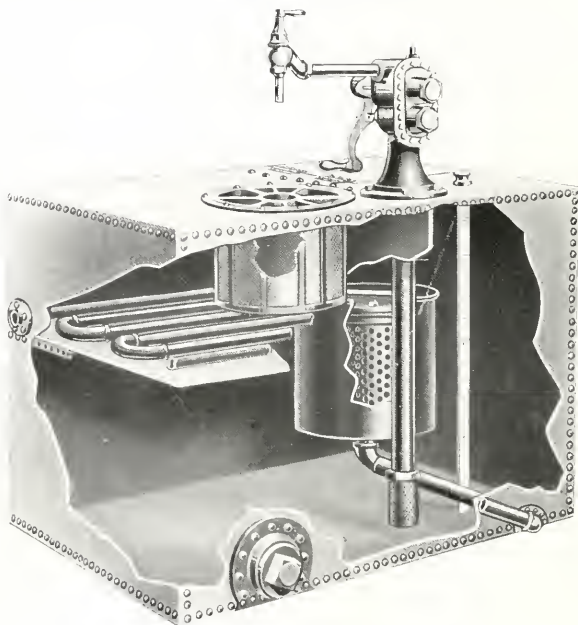
Wayne Type "T" Batch Filter

Introduction

This filter is designed to receive dirty oil in batches and cannot be used with a continuous circulating system. The batch method of oil filtration is always best when conditions will permit of its use. In a Batch Filter the dirty oil is held for a period of time at perfect rest. This allows the heavier than oil impurities to precipitate or settle out of the dirty oil.

The Type "T" Filter is built in two compartments. The first, or Receiving Compartment, is also utilized as the precipitation compartment. The dirty oil, after it has been allowed to precipitate its impurities, is run by gravity from this compartment through a Wayne Cloth Filter Unit and into the lower compartment of the filter which serves as a clean oil storage tank. The cloth filter unit removes those impurities from the oil which will not precipitate. If water is contained in the dirty oil, either in a free state or in an emulsion, it is separated from the dirty oil by means of the heat from the steam coils contained in the Receiving Compartment.

In determining the size Type "T" Filter to use, the size of the batch only is taken into consideration. The Receiving Compartment of the filter should be of a capacity as large as the batch. In using this filter to serve Horizontal Turbines, the size filter should be used that will receive the oil from the largest turbine. If the turbine oil is filtered as frequently as every two weeks, one filter will serve five turbines and still allow ample time for precipitation.

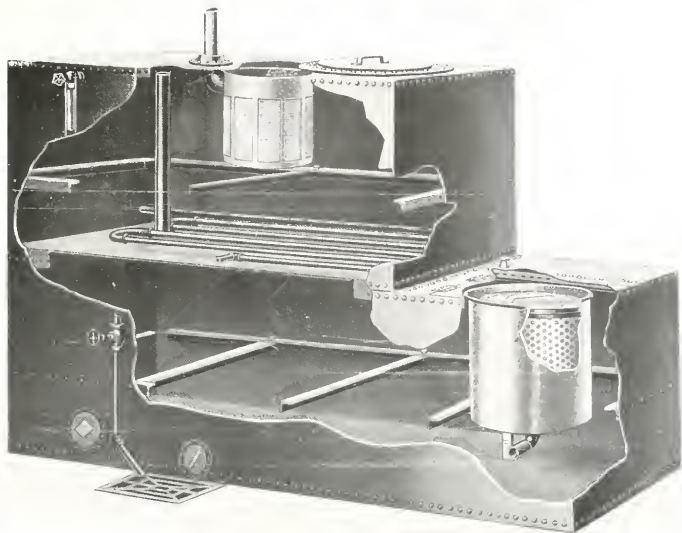


Sectional View Type T Filter, No. 1 Size

Suggested Uses for Type "T" Filter

For periodically filtering oil from:

- Horizontal Turbines,
- Diesel Engines,
- Steam Engines having a splash system of lubrication,
- Air Compressors with splash lubrication,
- Gas Engines,
- Machine Tools having self-contained lubricating systems,
- Motor Test Blocks,
- New Machines tested with oil.



Sectional View Type T Filter, No. 3 Size
Wayne Filters Are Easy to Clean.

The above view of the number 3 size shows the screen pail, ample heating coil and location of the cloth filter unit. Please note the tank construction showing angle iron bracing. All Wayne Filters are built to Wayne standard of construction for years of service.

Operation and Description

The Type "T" Filter is built with two compartments. The upper compartment receives the dirty oil and the lower stores the clean oil.

Receiving Compartment

The dirty oil enters this compartment through a brass wire screen pail which removes the coarse impurities from the oil. A manhole is provided in the top of the compartment for removing the screen pail for cleaning. **WAYNE FILTERS ARE EASY TO CLEAN** and wherever dirt is taken from the oil, the best method is provided for taking the dirt from the Filter.

On the bottom of the receiving compartment is an ample steam coil which will quickly raise the temperature of the dirty oil to a point where its viscosity is greatly reduced and it becomes thin. This thinning of the oil is necessary as an aid to precipitation. The heat from the coils also breaks up any emulsion of oil and water so that the sludge and water will quickly settle from the oil.

The dirty, thinned oil is allowed to stand at perfect rest for a period of time, depending on the condition of the oil. While so standing, all those impurities which are heavier than the oil will settle with the sludge and water to the bottom of the compartment. The point of draw-off from this compartment to the cloth filter unit is located at a point 61½" above the bottom of the compartment

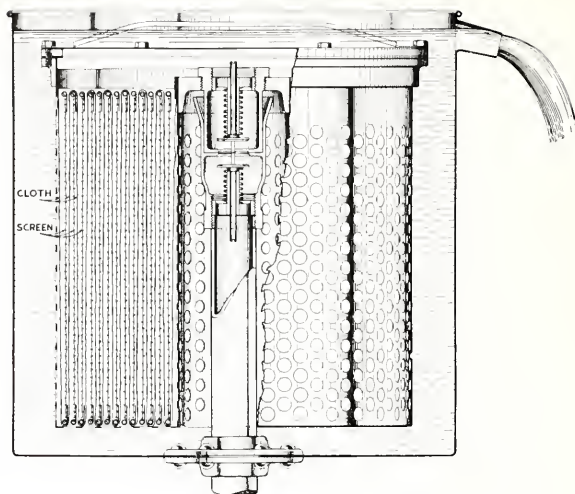
so that none of the sludge or water settled from the oil will pass to the cloth filter unit. This so protects the cloth filter unit that a great quantity of oil can be passed through it before it must be cleaned.

A sampling valve of polished nickel is provided at the same level as the draw-off valve from the precipitation compartment. This is used to determine the quality of oil at this level before it goes to its final straining in the cloth unit. If there is water or sludge at this level, it can be lowered by means of the sludge drain valve located at the lower edge of this compartment.

A valve is provided for the admission of water to the precipitation compartment so that all sludge can be flushed to the sewer. The opening of this valve, filling the compartment with water and then opening the sludge draw-off valve is all that is necessary to dispose of 85% of the dirt taken from the oil.

Clean Oil Compartment

After the oil has been freed of the most of its impurities in the upper compartment of the filter, it is allowed to run by gravity to the Wayne Cloth Filter Unit mounted in the lower or clean oil storage compartment. The partially cleaned oil passes through the fine muslin cloth of the filter unit which removes the last of its impurities. It overflows into the clean oil storage from the filter unit and is ready for reuse in as good a condition as when new.



The Wayne Cloth Filter Unit
Wayne Filters Are Easy to Clean.

The Wayne Cloth Filter Unit

The oil, after leaving the precipitation compartment, flows through the cloth filter unit which removes the last of its impurities.

The cloth filter unit is a special Wayne design and is used in all of the larger types of Wayne filters. It contains 44 square feet of closely woven cloth held without folds so that every square inch is filtering surface.

This filter is made up in the form of a tube 4 inches in diameter at one end and 13 inches at the other. The small end of the tube is securely banded to the center post of the container basket and held in vertical sections by a series of cylinders made of galvanized wire screen, each cylinder being larger than the preceding one, the cloth tube being of increasing diameter. It is held free from folds so that every square inch of cloth is utilized as a filtering surface. The large end of the cloth tube is banded to the inside of the shell of the container basket. The container basket has a solid head which is fitted over a felt gasket and held on by screws. It is provided with a handle for convenience in removing.

The oil rises through the center tube of the basket when it is in place on the header post, and passes downward through the cloth. All dirt taken from the oil in this unit is retained in the cloth until it is removed for cleaning.

Both the filter post and the basket are provided with valves, the stems of which engage when the unit is in place, allowing a free passage of oil to the unit. These valves automatically close when the section is removed for cleaning.

The entire unit is placed in an open top receptacle which allows it to be immersed in oil, thereby maintaining a constant head over its whole surface.

We wish to call particular attention to the fact that the Wayne Filter Unit has a large area of cloth under a low constant head which is free from folds and in which the dirt taken from the oil is self-contained.

Construction and Finish

The Wayne Type "T" Filter is built in three standard sizes and can be made larger on special order. It is constructed of heavy galvanized steel sheets with all seams riveted and flushed with solder. It is dust-proof and fire-proof. All exterior fittings are of polished nickel. The Filter is finished in green and black enamel, being given two coats of enamel and one coat of color varnish.

Accessories

The only accessory required with this filter is a pump to take the clean oil from the filter to the point of use.

We are prepared to furnish Wayne Cut 4010 motor driven pumps, hand operated measuring or non-measuring pumps or duplex steam pumps.

If steam heat is not available for the precipitation compartment, electric heating coils will be furnished at an added cost.

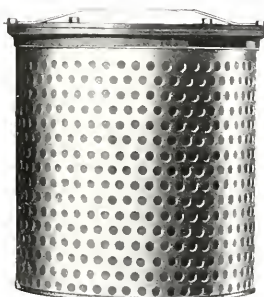
Wayne Filter Unit Parts



Supporting Cylinders



Basket



Unit Complete



Method of Binding Cloth



Cover Removed

Wayne Filters Are Easy to Clean

Cleaning

The man who operates a filter is interested as much in the time and labor it takes to clean the filter as he is in the work it does.

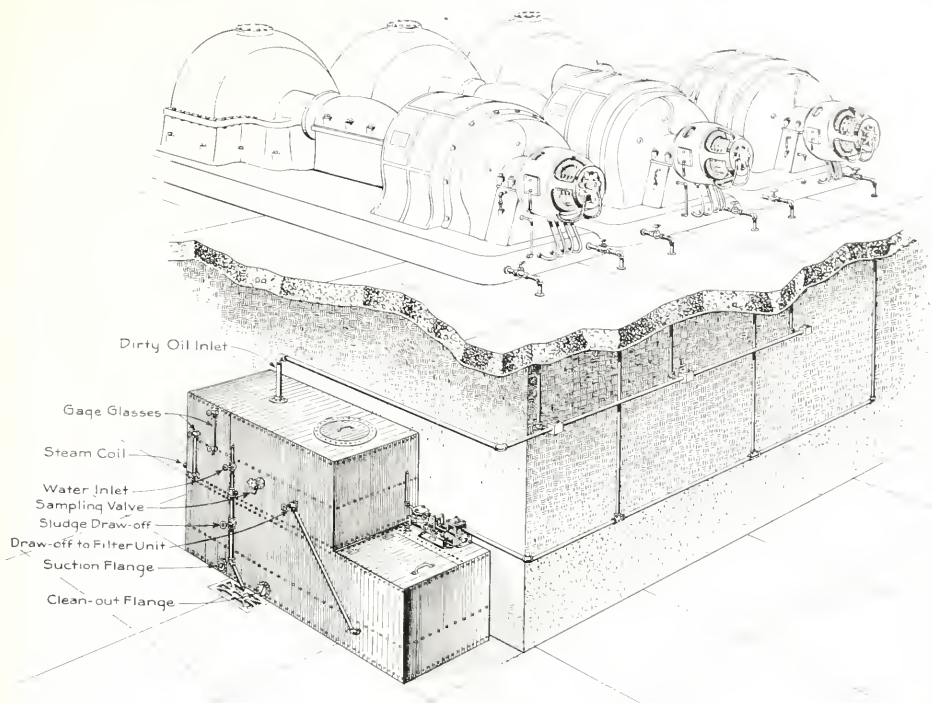
The screen pail through which the oil first enters the filter is easily removed through a manhole provided for that purpose.

The precipitation compartment is provided with a sludge draw-off to run all the precipitate to the sewer. A water connection is also provided to this compartment so that all of the sludge can be washed away.

The cloth filter units are removable from the filter post and contain only the dirt and slime they have taken from the oil. The two bands binding the cloth to the basket are removed and as the cloth is rolled up, it is turned inside out so that the dirt is readily removed by washing the cloth tube in a pail of gasoline or naphtha. One extra filter cloth is provided for each unit so that the unit may be immediately replaced in service.



Wayne Filters Are Easy to Clean.



Type T Filter Serving Steam Turbines

The above illustration shows a typical installation of a Type T-3 Large Batch Filter installed in connection with three horizontal steam turbines.

A batch of oil is allowed to run by gravity from one of the turbines into the precipitating compartment of the Filter. A batch of clean oil is immediately pumped up to the turbine from the clean oil storage in the filter and the turbine is at once ready for operation.

The batch of oil is heated until any emulsion in it is broken up and the oil has become thin, or reduced in viscosity. The steam is then shut off and precipitation takes place while the oil is thin and at perfect rest. After the sludge and water has settled to the bottom of the compartment, the semi-clean oil is allowed to run through the cloth filter unit into the clean oil storage. The sludge is washed to the sewer and the filter is ready to serve another turbine.

It is good practice to filter turbine oil every two weeks. By so doing, the chances of it becoming emulsified are remote.

INDIANA COLLECTION

Data Required

1. Kind of oil to be filtered.
2. Maximum batch of oil to be filtered.
3. How often is this batch gathered?
4. If the filter is to serve steam turbines, give number of turbines and oil holding capacity in gallons of largest turbines.
5. What steam pressure will be available at the filter?
6. If electric heat must be used state voltage, phase and cycle of current.
7. If electric pumps are to be used state voltage, phase and cycle of current.
8. If electric pumps are to be used give vertical and horizontal distance in feet from filter to point of discharge.

Dimensions, Capacities and Shipping Weights---Type T Batch Filters

Size No.	1	2	3	4
Length	41"	57"	87"	103"
Height	29½"	59"	59"	59"
Width front to back.....	28"	34"	34"	42"
Capacity dirty oil above drawoff.....	28½ gal.	100 gal.	200 gal.	300 gal.
Total capacity dirty oil.....	35 gal.	130 gal.	250 gal.	380 gal.
Capacity clean oil.....	75 gal.	200 gal.	318 gal.	450 gal.
Heating surface of steam coil.....	2.3 ft.	3.5 ft.	6.4 ft.	9.5 ft.
Filter unit	1 small	1 large	1 large	1 large
Square feet of cloth.....	22	44	44	44
Square inches of precipitation surface	665	1225	2240	3450
Shipping weight	400 lbs.	900 lbs.	900 lbs.	1300 lbs.

Note: The Type T-1 is standard with a rotary hand pump.



